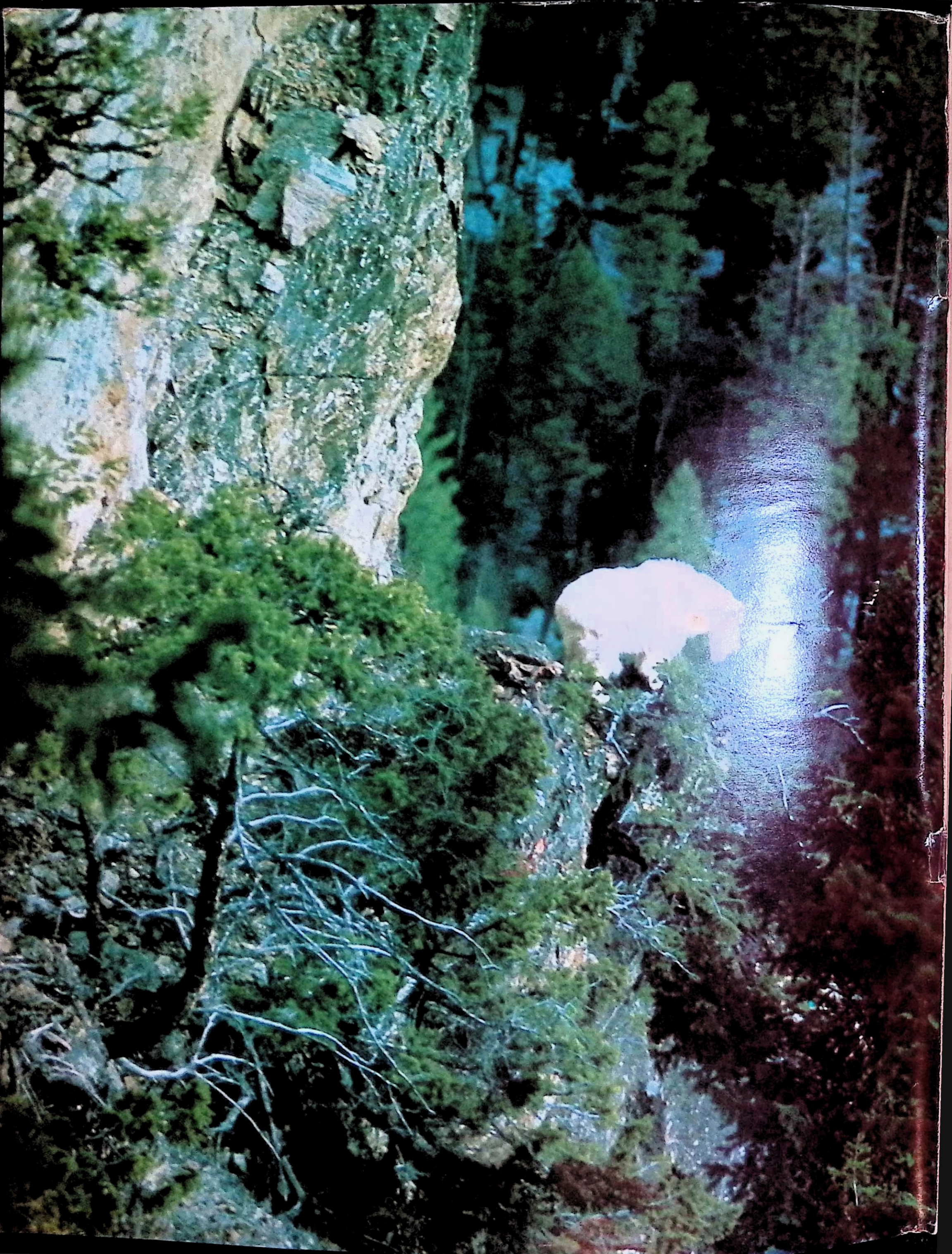
AUGUST 1974

Defenders OF WILDLIFE INTERNATIONAL



Defenders
OF WILDLIFE
INTERNATIONAL

Photo of grizzly mother and cub by Steve Johnson

Vol. 49, No. 4 **August 1974**

Published bimonthly by Defenders of Wildlife, a national, nonprofit, educational organization dedicated to the preservation of all forms of wildlife. Copyright 1974 by Defenders of Wildlife, 2000 N Street, Northwest, Washington, D.C. 20036. All rights reserved. Second class postage paid at Washington, D.C. Subscription to DEFENDERS OF WILDLIFE INTERNATIONAL magazine is included in all classes of membership. Annual subscription price, $7.50.

Officers and
Board of Directors

Louis Barassi
President
Dr. Robert Rienow
Vice President
Elting Arnold
Secretary
Robert B. Leahy
Treasurer

Mrs. Ord Alexander
James Baird
Dr. Walter S. Boardman
Dr. Ralph Buchsbaum
Dr. Victor H. Cahalane
Mrs. Beula Edmiston
Dr. Leonard Hall
Kenneth Morrison
Fred M. Packard
Dr. Richard H. Pough
Mrs. Dorothy Richards
Mrs. J. Lewis Scott
Edward Steele
Mrs. Christine Stevens
Lloyd Symington
Mrs. Martha Hayne Talbot
Ralph Townsend
Dr. Henry M. Weber
Burdette E. White, F.P.S.A.
Mary Hazell Harris (honorary)
Executive Director-Editor Emeritus

Sponsors
Cleveland Amory
Herford N. Elliott
Edmund C. Jaeger, D.Sc.
Carl O. Marty
Karl Menninger, M.D.

Cover: Paul Hoffmaster, veteran Washington, D.C. artist, portrays a terrible moment of truth in his vibrant watercolor of modern whaling. Mountain gal Beth Chadwick took the striking photo of the mountain goat.

August 1974
Vol. 49, No. 4

Defenders

CONTENTS

261 The Bloody Business of Whaling
Delphine Haley

266 Living With Rocky Mountain Goats
Douglas and Elizabeth Chadwick

272 The Largest Whale
Victor B. Scheffer

275 Grizzly Hunting Curbed
Aubrey Stephen Johnson

277 Watching Humpback Whales
Faith McNulty

283 Leatherback Beach
T. H. Stubbs

286 Six Months of Patrick
Elizabeth Wagner

288 Sea Wolves of the Northwest
Raymond "Sandy" Davis

293 Spiked Lamb Dulls Coyote Appetite
Carl R. Gustavson

295 Aravaipa
Anne LaBastille

307 Battle for the Whales
Christine Stevens

314 Elkins Park Students Dig Ecology
Deborah Duff

316 Piggy Wears Out His Welcome
Raymond "Sandy" Davis

322 Arizona Mountain Lion
Aubrey Stephen Johnson

328 Sheepmen Want 1080 Back
Dick Randall

---

259 Wayne Barrett's Who, What, When, Where

260 The Mailbox

260 Letter From Mary Hazell Harris

310 Encompassing North Point
Helen Ward Gall

319 Animals in Danger
Robert M. McClung

325 Wildlife in Captivity
Cecile B. O'Marr

331 Report From Capitol Hill
Elizabeth Bennett

334 Wildlife Bills in Congress

338 Editorial cartoon
Bill Mauldin

339 Editorials

341 Book Reviews

Wayne Barrett
Editor
Elizabeth Bennett
Assistant Editor
Anna J. Miller
Copy Editor
Deborah Duff
Editorial Assistant

Gale E. Gooding
Assistant Vice President
Anna M. Yohn, Thelma Barnes
Membership
Margaret Sharp
Accountant
Henrita B. Thorpe
Executive Assistant

Lucian B. Jackson
Junior Education

Field Representatives

Raymond "Sandy" Davis Aubrey Stephen Johnson Dick Randall
Cecile B. O'Marr Richard Pacheco

IWC FAILS AGAIN

Just as this issue went to press, the bad news arrived from London. On June 25 the fifteen member nations of the International Whaling Commission rejected a United States plea for a 10-year moratorium on all whale-killing. Instead, they voted for an Australian amendment which would provide for selective moratoriums on certain stocks; these selective moratoriums would be imposed at the discretion of the Scientific Committee of the IWC.

The text of the resolution provides for three categories with the Scientific Committee responsible for determining into which category a specific stock would be placed:

"A. Initial management stocks which may be reduced in a controlled manner to achieve maximum sustainable yield levels and then optimum levels as these are determined.

"B. Sustained management stocks which should be maintained at or near maximum sustainable levels and then at optimum levels as these are determined.

"C. Protection stocks, which are below the level of sustained management stocks as described in (B), which should be fully protected.

"The Committee should define stocks for this purpose, as the units which can be most effectively managed individually.

"Commercial whaling shall be permitted on 'initial management stocks' subject to the advice of the Scientific Committee as to measures necessary to bring the stocks to the maximum sustainable yield level and then to the optimum."

The vote on the preceding amendment was 13 to 2. Predictably, Russia and Japan voted against it. It is still possible for these two countries to nullify the agreement; under the Commission's rules, a country need only lodge an objection within 90 days not to be bound by a measure agreed to by the Commission.

At last year's meeting both countries nullified three significant Commission agreements by lodging objections. They exceded the quotas set annually by the Commission on the sperm and minke whales, and refused to observe a phasing out of fin whaling in the Antarctic by 1976.

Should Japan and Russia not lodge objections against the selective moratorium, it would be a high point in the history of the 26-year-old Commission, which functions as a rubber stamp for the whaling industry. The paramount objective of the Commission, as stated in their convention, is "to provide for the proper conservation of whale stocks and thus make possible the orderly development of the world's whaling industry."

Once again, the IWC has failed in its responsibility to the peoples of the world. Once again, its actions have been determined by the greed of two nations.

WAYNE BARRETT'S

Who What When Where

This is a whale of a magazine. Literally. Between the covers, adorned with **Paul Hoffmaster's** watercolor of a modern whaling scene, you will find half a dozen articles on whales, a **Bill Mauldin** cartoon that says it all, and a challenging editorial by DEFENDERS Vice President **Dr. Robert Rienow,** this issue's special consultant. He coauthored *Moment in the Sun,* is Professor of Political Science, State University of New York at Albany. Two new books that should interest you are **Victor Scheffer's** *A Voice for Wildlife* and **Faith McNulty's** *The Great Whales.* (A sampling of the latter is within.) The centerpiece of this issue portrays the beauty of Aravaipa Canyon in Arizona. Author **Dr. Anne LaBastille**-whose credits have appeared in many publications-photographed Aravaipa last April, when the Sonoran flora was in bloom. This "little Grand Canyon" is not only beautiful, it's peaceful-especially for the wildlife. You won't find any poisons and traps there, or hunters blasting away. Attention "varmint" executioners: Read **Dr. Carl Gustavson's** article on taste aversion before you kill another coyote; he's developing a predator control you can live with. So can the coyotes. There is bad news in the adjoining space. The resolution of the International Whaling Commission, despite its verbiage on selective moratoriums, is a license to continue killing whales. Russian and Japanese factory ships are in a race, therefore, for the grisly honor of butchering the last whale on earth. Japan is vulnerable to a boycott; the Soviet Union is not, unfortunately. But if Japan caves in, the Russians may find it embarrassing to carry on their bloody business alone. Don't think your refusal to buy Japanese products is a punitive act; on the contrary, it would be an act of mercy. For how you spend your money on cars, cameras, etc. may determine the whales' fate. This magazine, if read by enough people, could be instrumental in saving the whales from extinction, and in preserving other forms of wildlife. Share your DEFENDERS with a friend. For Christmas and other occasions, you might give a subscription instead of items made in Japan. To show our appreciation, we will send you our 1975 Endangered Species calendar.

The Mailbox

Fur trim cut

Dear Editor:

I have your letter [See June Defenders] concerning our Snorkel Parkas and your comments concerning selling an item that uses wolf fur. In reply I wish to advise that we have decided to eliminate this item from our line and thus will only be selling the balance that we have in stock.

Harry H. Bernbaum
Seaway Importing Co.

Non-stop hunting

Dear Editor:

I just read Donald E. Winslow's letter in the April issue of your magazine. I can fully identify with his problems—and, on the contrary, do NOT mistake him as a prankster in the least. We live in Northern Wisconsin in an agricultural area. Our area has been spared total deforestation because it is quite hilly. So, consequently, we have woods, though nothing like the national forests further north. We do find that we have many varieties of wildlife, and have chosen a secluded, scenic spot to build our log cabin house, to live happily ever after close to nature.

The sour note, however, is that we share these poaching problems, although not so recurring on our land in particular, which is mostly wooded. The whole area is saturated with poaching and the attitude prevails of "take whatever you want." When asked if we were going to hunt deer our first fall here for instance, rather than going into detail on our non-hunting beliefs, I told one local we hadn't a license. He chuckled and said that we should just go into our woods and get one. They hunt in January, September, whenever. (Season is 10 days in November here). Front halves and heads alone have been found frequently. They hunt night or day. Just recently, a county youngster found the only known resident bald eagle in this county, Shot. She was thought to have mated. I could go on and on. Dog packs. Fox hunters that trap or "hunt" in December by sitting in a heated truck while his hounds bound cross-country after Mr. Fox. (There was a pair of red foxes last year on our place—gone now). In December, we witnessed a particular man's hounds "hunting" thusly, except that they were running down a deer across our place while we helplessly watched on, only to anticipate the final outcome of the tiring doe who had lived through traditional hunting "season".

The problem is that the local marshall likes to kill, and chucklingly listens to the kill stories told at the small town bar by his acquaintances. The county warden is 42 miles away. Do they know what is going on? One does, and thinks it's cute. The other is too far away to fully realize the situation. Some arrests were made last year by plain-clothes wardens. I could never find the outcome of it.

I fear the token wildlife population that was left in this state after it was raped in the '30's for timber is dwindling rapidly because of these instances. And how can we jolt an ignorant enforcement agency that cannot think more than one generation ahead of itself? Perhaps, that's our collective problem.

Jan Jacoby
Clayton, Wisconsin

A trapper objects

Dear Editor:

I am writing about the article in the April, 1974, issue. It is on page 87—the advertisement on trapped. I am a trapper. And I feel what you have printed is wrong. I know a lot of trappers and I have not seen them trap animals and leave them in the traps to die. Most traps are checked daily, and many of the animals I have found caught in many traps were asleep when I got there.

You must not know the facts about the subjects you are trying to condemn, or else you are telling a lie. I think you should print both sides to the story and let the public decide on which they want to choose.

I just thought I would tell you the other side to your story.

Joey Bowen
Linden, North Carolina

Graphic illustrations

Dear Editor:

Your April issue is very effective. Please include ways we may help with such articles as "You Can Hear Them From Quite a Distance." I think this has been the most graphically illustrated magazine I have yet received.

I wish there was a way to reach those who inflict such cruelty on helpless creatures.

Catharine T. Young
Williamsburg, Virginia

Dear Editor:

The pictures on pages 87, 99, 113 and 115 of the April issue prompted my husband and myself to send another $100, which is enclosed. Hope your good work prospers.

Mrs. J. C. Findley
Cincinnati, Ohio

Turned off by gore

Dear Editor:

A long time member of Defenders and actively involved in wildlife conservation, I have been consistantly "turned off" by the repeated gore presented in DOW News. The result is, that I rarely read your magazine, but instead, keep copies on file for reference.

In my opinion, the magazine should be more balanced to represent the good things that are happening for wildlife, as well as the bad. There is no question that poisoning, trapping, denning, and many other atrocities against our wildlife must be exposed, but page after page of this type of exposure tends to instill a feeling of futility in the reader. (where do you start writing needed letters?)

In addition to the above, I would like to comment that essentially, Defenders of Wildlife News is an adult magazine. Children's stories anthromorphising wild animals are corney and inappropriate . . .

Bruce Keegan
San Francisco, California

Letter From Mary Hazell Harris

Dear Reader:

Recently, two high school students called me inquiring where butterflies were most likely to be found. They had been unsuccessful in locating enough for school observation assignments.

One student was surprised to the point of laughter when told to search out damp, wet areas, and particularly mud puddles. Here I once noted several dozen butterflies with their long coiled tongues extracting something, probably salt, from the mud and water. Salt is an important element in most, if not all, animal diets.

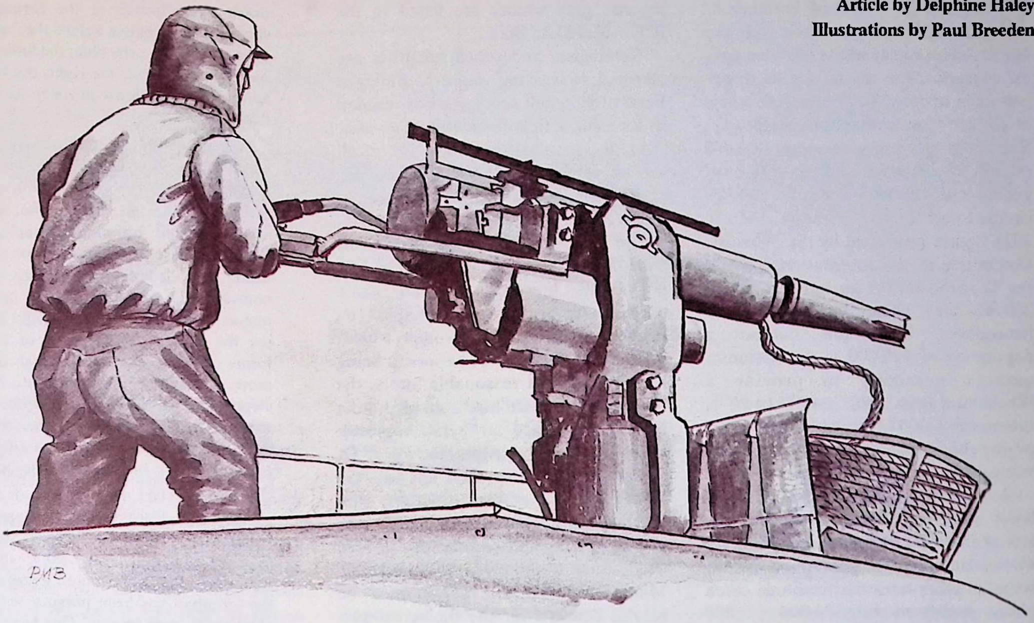
Many butterflies are beautifully colored. They have slender bodies, large eyes, long rolled-up sucking tubes, hairy or scaly skin, broad outspread wings, and hairy legs.

Some of the butterflies frequently seen meeting at the mud puddles may be listed as Buckeye, Common Yellow Sulphur, Tailless Blue Swallowtail, Yellow Tiger Swallowtail, and Zebra Swallowtail.

Perhaps a word of caution should be dropped to people of all ages, who could be subjected to the mystery and fascination of butterflies.

With thousands of varieties migrating many hundreds and thousands of miles, comparatively few of us may be safe from their influence. They have caught and held the lifetime interest of many naturalists, so Beware!

Article by Delphine Haley
Illustrations by Paul Breeden



The Bloody Business of Whaling

The harpoon gunner steadies himself on the rolling deck. BAM! The gun recoils sharply and the boat shudders from the shock. Snakelike, the harpoon line whips through the air towards its target. The line is still uncoiling when, with a dull sound, the bomb explodes within the giant mountain of flesh. It's a hit—another whale is taken.

If the harpoon gunner's shot is true, a hit behind the flipper in the thoracic region, the whale dies right away. But all too often the process is slow and agonizing. The whale will either dive to experience its death throes in the private depths of the sea, or thrash its life away on the surface. From its wounds incredible streams of blood begin their final flow, the giant heart makes a last effort to sustain life and the lungs fill with blood, turning the spout from a misty crimson spray to a thick red cascade. In the end, defeated, the great whale rises to the surface, offering its pale undersides to the sky.

Now the conquerers come forward to claim their prize. From a catcher boat, they insert an air spear into the whale so that it will remain buoyant. As the air goes in, a stream of bubbles leaks from a wound; it is quickly plugged with tow. Sometimes the whale's flukes are cut off, so that the huge animal will not be propelled along by the action of the sea. Then, after radioing the position of the kill to the factory ship, the catcher boat sets out on the hunt once more. For awhile, the great whale floats alone, its mighty bulk punctured by a harpoon, a flag, light, radio-signaling device, and radar reflector.

Today's whaling, with its catcher boats and factory ships, is principally the business of Russia and Japan. England, the United States, and Canada have now shut down all whaling operations. Though about 20 shore stations (eight belonging to Japan) are still in business throughout the world, this number is many less than it was 30 years ago. As for whaling via factory ships, only Russia and Japan remain afloat.

In 1972-73, there were 12 factory ships and 126 catcher boats on the high seas. The fleet was distributed in the Antarctic (four Japanese factory ships and 35 catcher boats; three Russian factory ships and 47 catcher boats) and in the North Pacific (three Japanese factory ships and 25 catcher boats; two Russian factory ships and 19 catcher boats). This number of whaling boats in the two major hunting areas of the world is only *half* the number that existed in the 1950's in the Antarctic alone. (The third area, the North Atlantic, is now a whaling wasteland, long since devastated.) Why? Because the resource is dwindling. The whales are going, going, almost gone.

A free-lance writer specializing in natural history subjects, Delphine Haley was formerly on the staff of Pacific Search.

Hundreds of years of commercial hunting have taken their toll. The North Atlantic gray whale has been gone for centuries, the reason for its disappearance uncertain. The largest whale of all, the blue whale—which stretches up to 100 feet and can weigh 300,000 pounds in rich meat and oil—is almost gone. Heavy hunting in the 1930's claimed over 29,000 in one year alone. 1973 figures published by the Scientific Committee of the International Whaling Commission list an initial stock of 200,000 blue whales for the southern hemisphere. From this number a population of 125,000 is the optimum number necessary to provide a "maximum sustainable yield." In 1972, there were 6,000 blue whales and 6,000 pygmy blue whales in the southern hemisphere.

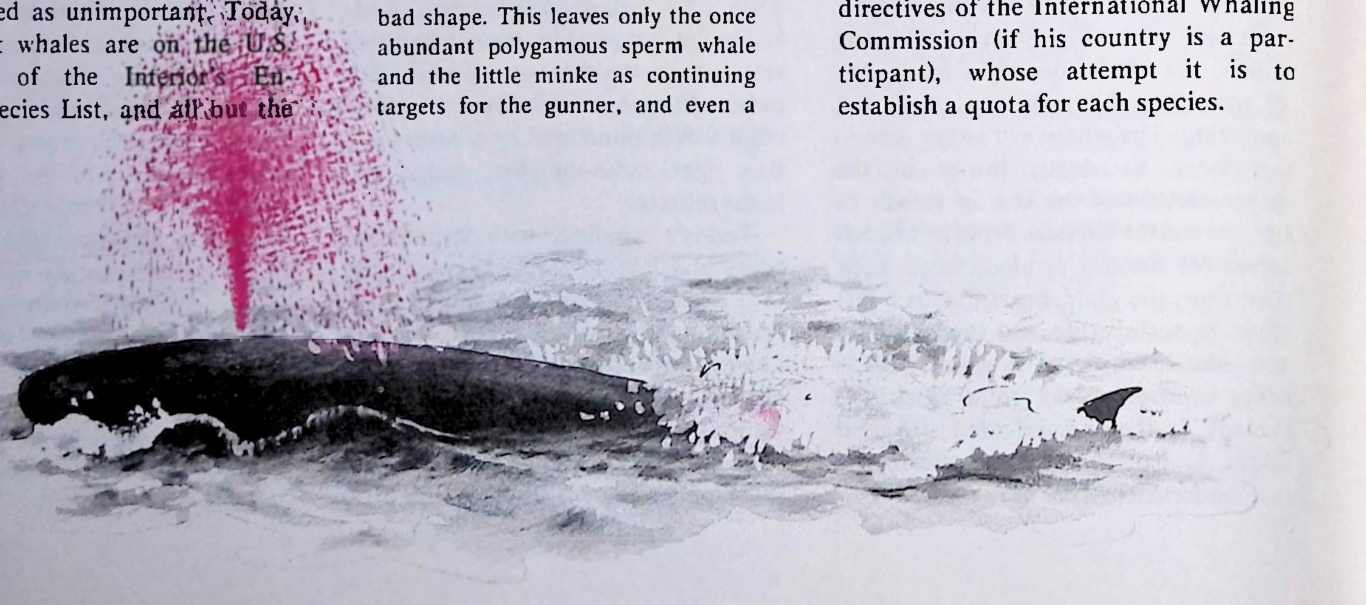
As the harpooners began to sight fewer and smaller blue whales, at the end of the 1930's they turned to the fin whale, the next largest. As a result, some 20 years later the fin whale catch plummeted from about 29,000 to 3,000 within a span of five years. The next victims were the 50-foot sei whales, which are still pursued today. Meanwhile, the slow-swimming humpback whales whose "songs" have been recorded and studied, are all but gone from the Atlantic Coast (about 100 in 1972) and throughout the rest of the world. The sperm whale, prized for its oil in the 19th century, is once again on the "most wanted" list. More recently, whalers have resorted to taking the smaller species like the minke whale, which is less than 30 feet long and formerly spurned as unimportant. Today, all the great whales are on the U.S. Department of the Interior's Endangered Species List, and all but the sei and gray whales are listed in the ICUN Red Data Book.

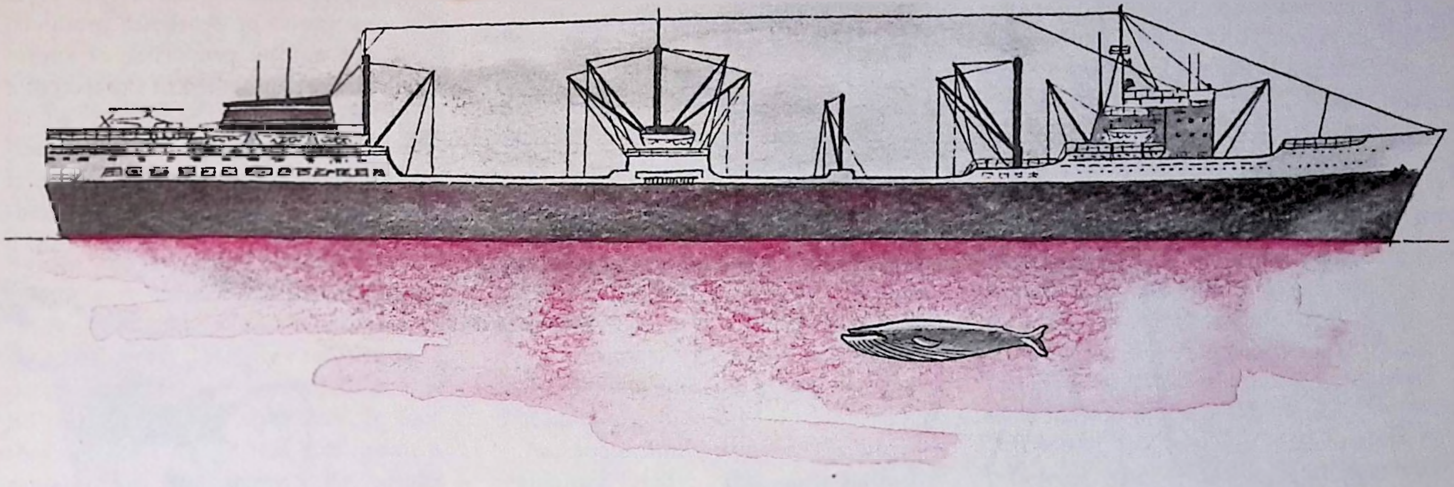
Cetologists and other scientists are alarmed to varying degrees. Biologist Edward Mitchell sets forth one opinion in a recent article for *Nature Canada*. It is his appraisal that all stocks of all species of larger whales presently exploited are near or above the needed levels for maximum sustainable yield, except the southern hemisphere fins and the North Pacific fins. "This does not mean, however, that all whale populations are in good shape," he cautions. "Although exploited whales such as the sperm and the sei are being harvested within reasonable limits, the fins of the southern hemisphere and the North Pacific are far below the level giving maximum sustainable yield. Of the presently unexploited species, the North Atlantic right whale, the southern right whale, many populations of humpbacks and populations of blue whales are definitely not abundant." Mitchell concludes: "There must be serious concern for the biological survival of these stocks."

Other cetologists like George Small or Roger Payne would find Mitchell's conclusions a great understatement. They, among many others, have been sounding the alarm for years. Scott McVay of the Environmental Defense Fund puts it this way:

> The blue whale, the humpback, the bowhead and the right whale are on the ropes. The fin whale, still hunted, is in desperate shape and should be fully protected. Some biologists believe the sei whale is in nearly as bad shape. This leaves only the once abundant polygamous sperm whale and the little minke as continuing targets for the gunner, and even a passing recollection of the carnage should give us pause before they are brought as low as the blue, the humpback, the bowhead, the right, the fin and the sei. We must begin to learn from past mistakes.
>
> When an effort is made to look at which of the plundered whale species might still be "cropped" without threatening biological extinction, we are instinctively following the hapless pattern of past predation. A new attitude is called for—a strategy of non-violence, non-manipulation and non-exploitation. We must begin to see the inner connectedness of all forms of life, even as we cherish its most spectacular manifestations in elephants, otters, giraffes, sequoia, men and whales. We must assume the posture of an eager learner with a few good questions but none of the answers.
>
> We must learn to focus on the living whale in all its majesty and mystery and not on whal*ing*, the killing of whales. For seven decades the leviathan has been pursued with mechanistic monomania. Our genius must be turned to preserving as many stocks of great whales as we can so that a diversity of whales begins to replenish the oceans. We can no longer think of tinkering with annual kill quotas as in the past. We must stop the killing altogether and give the great whales the time—and it will be decades—to restore the stocks that are not already devastated.

None of these warnings has to stop the whale hunter, however. He is limited only by the laws of his country and to some nominal extent by the directives of the International Whaling Commission (if his country is a participant), whose attempt it is to establish a quota for each species.





But back to the big business of the factory ship. Russia has built the largest in the world. Its 700-foot length would dwarf the biggest blue whale. In one day, its crew of 150 men can process about 65 whales (if they can find them), producing 1,000 tons of oil, 260 tons of meal, and 100 tons of frozen meat. Moreover, the ship can store 18,000 tons of oil and 1,800 tons of frozen meat. Its attendant catcher boats, which function like so many electrons around the nucleus of the factory ship, measure between 130 and 200 feet in length, each with a harpoon gun at the bow and winches on the foredeck for "playing the whale." During the hunt, the catcher boats fan out in groups of 10 or 12 while the factory ship trails along some distance behind. The whole fleet, equipped with radio, radar, and sonar, works as an efficient unit to bring in and quickly process the whales. The whale doesn't stand a chance against such powerful, technological odds.

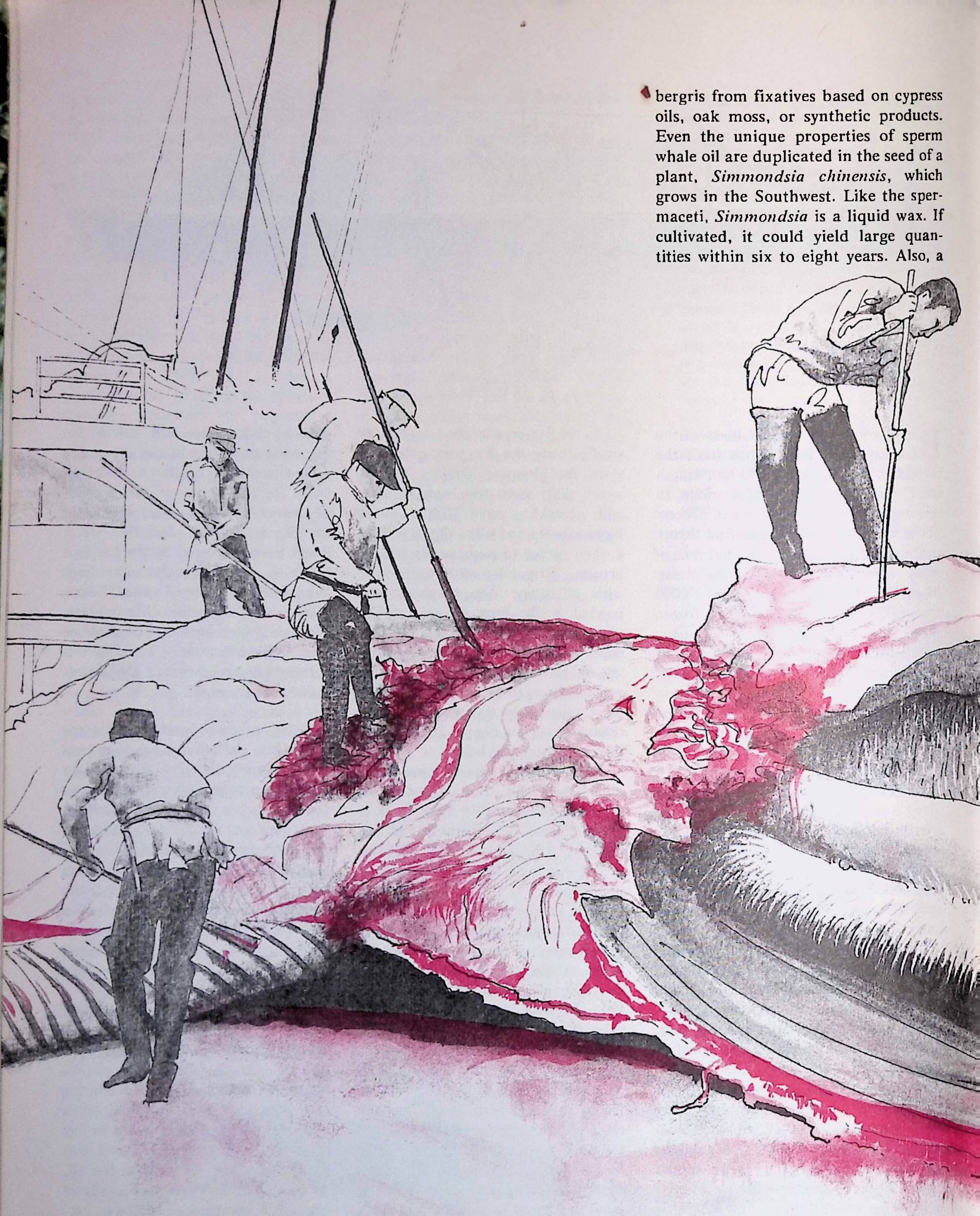
After the whale is killed, it is hauled aboard the factory ship via a slipway and onto the flensing deck. Here, mottled by the scars of unknown scrapes and predacious parasites, the leviathan lies, its wet mass gleaming like polished linoleum. Here it awaits the flensers, men armed with scythelike knives who will strip the whale of its blubber. They climb upon the colossal animal like so many Lilliputians. To avoid slipping in the oil and gore, some wear spiked shoes. They chop steps in the whale's side for better footing.

As the flensers slice the length of the swollen body, the skin parts quickly to show the gleaming blubber. Then a winch pulls each strip back; it parts with a crackling sound. With the aid of more winches and wires, the huge hulk is then turned to continue the peeling process. Strip after strip is removed with efficiency. Any harpoons embedded in the flesh are sent to the blacksmith's shop for straightening; the clawlike tongs are detached from the tail and returned via winches to the slipway for the next whale, while the blubber is dispatched through deck holes, thence through a hopper and into the factory cooking pots below.

Meanwhile, the whale's lower jaw is pulled open and disarticulated. After the flensers separate it from the body, it is lifted clear by a derrick. For one moment, it hangs at its full, awesome height—up to 20 feet if the victim is a blue whale.

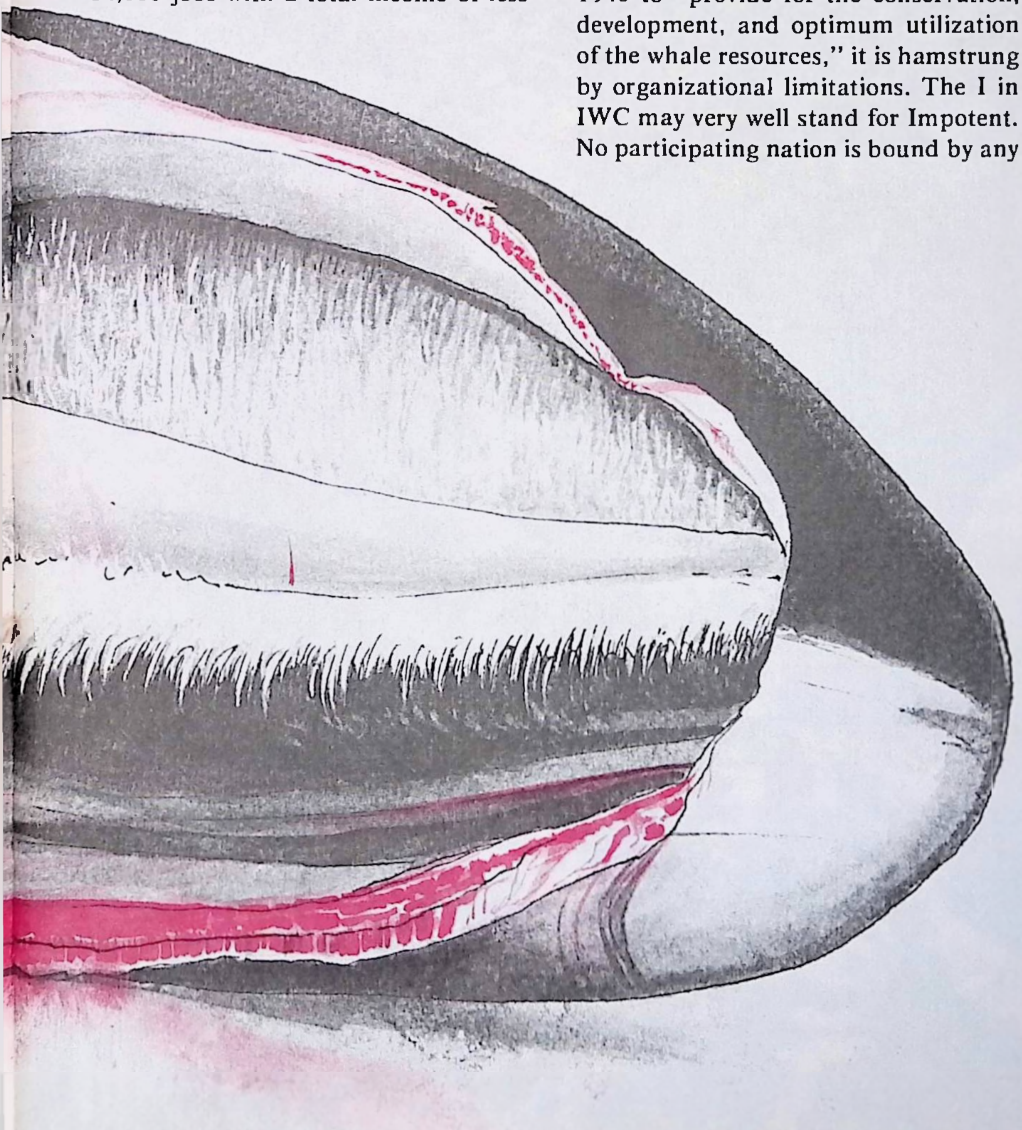
Next the deblubbered remains are hauled forward where the diminishing shape, now scarcely recognizable as a great whale, is dismembered into steaming piles of meat, entrails, and bone. Here the "lemmers" or butchers take over to "work up" the whale. Cables run in every direction, bone saws rear up to cut into the huge skeleton. The decks glisten with blood and entrails. Now the head is off, hanging clear while it is trimmed and moved to the bone saw until it is cut into chunks for processing. The muscles are parted from the great spine. Four-ton fillets of meat are freed. In a rainbow of shiny mauves, pinks, blues, and browns, the internal organs slide to and fro on the deck. One side of the chest hangs in the air as the ribs are separated in pairs. The rest of the carcass is stripped again for ribs and fillets. The liver—if it hasn't been splintered by the harpoon bomb—is moved through another deck hole to the vitamin A plant below. Finally, only the gigantic spine remains, and soon it too is butchered by the bone saw. Within less than an hour, there is nothing left on decks of the largest mammal in the world.

What precious products does the whale yield that it has been pursued so relentlessly? One answer might be: oil for soap and margarine, meat as a protein source for human and animal food, tendons for tennis rackets, or bone for fertilizers, teeth from the toothed whales for carvings and piano keys, or precious ambergris from the sperm whale as a fixative in perfurme. Most sought is the oil or spermaceti of the sperm whale, a particularly fine and versatile product for which factory ships carry special tankage. The spermaceti is used as a lubricating oil for light machinery or in ointments, creams, and lipsticks. However, a more accurate answer would be that there is no precious product to justify the continued hunting of whales. *None*. Today, anything taken from a whale can be duplicated by any number of other products. Animal food can be made from fish meal or fish oil, margarine from the vegetable oils of cottonseed, corn, soy, or safflower, ambergris from fixatives based on cypress oils, oak moss, or synthetic products. Even the unique properties of sperm whale oil are duplicated in the seed of a plant, *Simmondsia chinensis*, which grows in the Southwest. Like the spermaceti, *Simmondsia* is a liquid wax. If cultivated, it could yield large quantities within six to eight years. Also, a



synthetic version of sperm whale oil, called Chevron Chemical OLOA 910, has been developed by a Standard Oil of California research team.

What about whale meat as a protein source, an argument used by the Japanese to justify continued hunting? Although the Japanese do eat whale meat, the quantity is very small. Recent figures indicate that whale meat is slightly over 1% of Japan's total protein, the least popular source of its animal protein supply. Surely, as resourceful a people as the Japanese would be able to fill this protein gap elsewhere. In fact, they will *have* to fill this gap because, economically and ecologically, whales and whaling are on the wane. Whaling fleets operate at a loss, sustained only by the subsidies of their large parent fishing companies. The figures involved are by no means colossal: Worldwide the whale business accounts for about 14,000 jobs with a total income of less than $150 million annually.



Thus, a series of ironies present themselves: That whales are hunted for products, for the most part cosmetic and trivial, all of which can be duplicated by cheaper and more accessible materials; That they are hunted in spite of the fact that certain species are seriously endangered, some commercially extinct, and verging on biological extinction. Even if we looked at this "resource" with the businessman's practical eye, would not current commercial whaling be killing the goose that laid the golden egg?

No, some would answer. We have a regulatory body, the International Whaling Commission, which will protect these species and limit hunting. Others say that this group represents an irony as great as the size of the whale itself, for, at least up until 1965, the IWC has been ineffectual. Established in 1946 to "provide for the conservation, development, and optimum utilization of the whale resources," it is hamstrung by organizational limitations. The I in IWC may very well stand for Impotent. No participating nation is bound by any IWC regulations once that nation has registered a formal objection within 90 days of its passing. And there is no way to override the objection of any country. "What can they do?" I heard one cetologist say about IWC enforcement, "They could say they were displeased, but there's no way they can enforce their regulations. They could kick them out of the Commission, but that wouldn't do any good." Some whaling countries like Peru, Chile, and South Korea have not even bothered to join the IWC, and the original membership of 20 nations has now shrunk to 14.

Despite its mistakes and inherent problems, the IWC has managed to hold some nations at a conference table and continue discussion of the whale's future. In 1947 the right whales were given worldwide protection, and in 1966 the humpbacks and blues were finally declared off limits. (Even so, this cease-fire hasn't improved these populations to any extent.) In 1972-73 the IWC calculated and set forth the present sustainable yield for each species and established a quota on those whales which may still be hunted. Member nations now exchange observers who report any violations to the IWC. However, punishment for violations is relegated to each particular government involved.

Some feel the most desirable solution is a ten-year moratorium on all whaling, a motion which has failed to pass at previous IWC meetings.

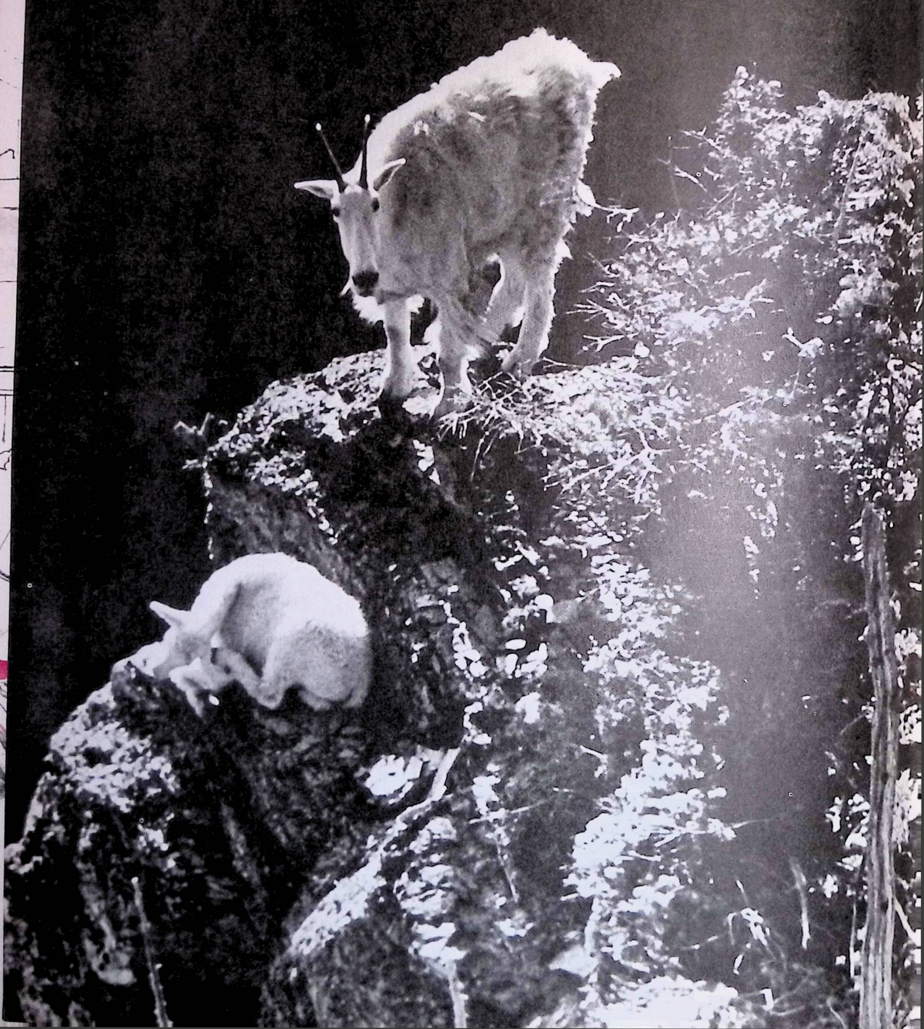
Conservation groups around the world have generated much of the feeling for a moratorium. Ambassadors and premiers in Russia and Japan have been besieged with letters of protest. Even the AFL-CIO passed a resolution at this year's annual meeting to "Save the Whales." Perhaps one of the most effective attitudes is seen on auto bumper stickers. It is written in language which, unfortunately, may be the only one that works: "Stop the Whale Killers - Boycott Japanese Goods." Fourteen conservation groups have recently called for support of this boycott.

Meanwhile, thousands upon thousands of whales are hauled onto the flensing floors.

Living With Rocky Mountain Goats

Article and photographs by

Douglas and Elizabeth Chadwick



High on the mountain's side, near the very top where wisps of clouds skimmed the ridgeline, Rapid Rosie had just completed her sixth attempt to hurl herself up a sheer wall of rock and was twisting in mid-air so that she could land on the thin ledge from which she started. If she failed to catch herself there, she would continue to hurtle down the cliff face for hundreds of feet before coming to rest in the shaded forest amidst remnant patches of snow. Most mountain goats rely upon their strength and a slow, deliberate climbing skill to traverse dangerously steep areas, but Rapid Rosie seemed to depend instead upon good fortune and sheer momentum.

"Hunting of all sexes and ages of mountain goats is permitted. The 25-pound kids themselves are fair game."

Earlier in the afternoon, this young female's racing about the cliffs had come to a halt on a narrow, tapering ledge. The ledge became too thin to cross, and was not wide enough to turn around on. Instead of gradually backing out of her predicament, however, she braced her forefeet on the outer edge of the ledge and proceeded to walk her hindquarters up the wall and over her head in a slow cartwheel until she was facing the opposite direction. Now, higher up the mountainside, she was stuck again. She shook her head and pawed impatiently, then leapt up the wall for the seventh time. Her spinning hooves caught an imperceptible crack, and she thrust herself upward to the next small ledge, and continued over the top. Across the mountain valley, two wildlife researchers who had been recording her activities pushed aside their telescopes and rubbed their tired eyes in disbelief, and relief.

If Rapid Rosie is still alive today, she is five years old; but we haven't seen her in some time. We have lost many of our shaggy, snow-colored acquaintances over the past four years; among them, Billy One-Eye who negotiated precipices with vision in only one of his eyes, and Nanny Not-Me, the reluctant climber who seemed almost afraid of heights. They were part of the mountain goat herds in the Swan Mountains, which begin at the southern end of Montana's Glacier National Park and form the western boundary of the Bob Marshall Wilderness. We have lived with these Rocky Mountain goats summer and winter for several years, sharing their steep hillsides and snowfields to learn about their lives, their techniques of survival, and to investigate the causes of recent declines in many places. This is the research we are conducting today with the support of Defenders of Wildlife, and we have included other wilderness species inhabiting the Swan Mountains in our studies, for most of them are poorly understood and all are coming within the sphere of expanding human disturbances.*

It is difficult to describe the world of the mountain goat. As we write this story, and perhaps as you read it, the horizon is obscured by people and the walls of buildings. Perhaps it would be best to close your eyes for a moment and imagine that you have just awakened in a mountain goat's bed. You have tucked yourself into a slate-gray cave on the snowy cliff face. A few mosses and dried grasses, shivering in the glacial winds, cling to cracks in the rock nearby. Through the drift and wash of clouds and snow, you can see a distant, jagged horizon. Upthrust peaks with snow cornices like frozen, rolling waves hanging from them, strips of

---

Early research was supported by the Montana Fish and Game Department through the University of Montana School of Forestry. The authors are indebted to the School of Forestry for additional support.

snowy, gray cliff walls, and fan-shaped avalanche paths all seem remote and strangely out of proportion. Your bed is tangible enough, encased in rock, hidden and sheltered. No enemy will approach on the thin, ice-bound steps of this mountain fortress. But away from the cliff face, between you and the horizon, there is only space; the realm of mists, winds, and ice crystals swirling together for thousands of feet above the canyon floor. As you gaze at the forest far below, perhaps you can make out something moving under the trees....

It is March of 1971. Bunker Creek is a high, wild mountain valley at the northwestern edge of the Bob Marshall Wilderness. The stream itself is muffled by deep snows and towering dark spruce trees of the canyon floor. A snowstorm howls across the icy cliffs and avalanche chutes of the mountainside, but the spruce forest is silent save for buried water sounds and the swishing of snowshoes, and only a few snowflakes sift through the branches.

We cross the tracks of wolverine and elk as we search for an opening from which to view the hillside. The blizzard sweeps on down the valley and the mists swirl apart. There on the cliffs, jumping from ledge to ledge like clots of falling snow, are a family of mountain goats. A yearling goat has just butted a small ten-month-old youngster, a kid, over a small drop. The kid's protective nanny rushes over to nuzzle her youngster briefly, then charges uphill with lowered horns toward the yearling. Running goats seem to dissolve in fog rising up the mountainside.

A half hour later, the fog lifts and we find the goats pawing through snow to reach grasses on the outer edge of cliff ledges. As they feed, it seems that each goat maintains a personal space of several feet about itself. Older and larger goats dominate the smaller and younger animals in small bands composed of females and subadults. There are frequent threats and chases on dangerously steep rock walls. Just before darkness and another storm hide the goats from view, they move toward the top of the cliff. After surveying valley and the cliffs below for several minutes, they bed beneath rock overhangs. Again, each goat is careful to position its bed at an appropriate distance from the others, except for the kids. These smallest goats, weighing perhaps 25 pounds, always bed touching their mother's uphill side; away from the winds and icy clouds, away from the edge and the great gulf of snowy space over the darkening wilderness valley.

In May we move upriver from an abandoned trapper's cabin to an avalanche meadow beneath the goat cliffs where snowbanks are melting away into glacier lilies and beargrass. We live beneath a piece of plastic strung between two fir trees, for the bears of the meadow have torn apart all our previous shelters with sides to them. The goats have begun using two natural salt licks on the lower cliffs and they have come to regard us as a sort of poorly furred bear, tolerating us within 200 or 300 feet as we move slowly and conspicuously within their domain. We are mapping the goats' home, gathering and identifying their foods, and learning to understand their language and social rules as we observe them throughout the day, and occasionally on moonlit nights. We are growing into our spring meadow with its unfurling of leaves and bright succession of flowers, following new scents and trails and sounds, and observing the cutthroat trout, golden eagles, elk, and many bears, black and grizzly, which share our mountain home.

Suddenly it is July, and the valley reverberates with the roar of bulldozers, drills, trucks, and chain saws. The goats move nervously to the top of the ridge, then flee the valley altogether as dynamite blasts shower dirt and rocks across the stream and into our coffeepot, and rocks are shaken loose from the cliffs. Then it is fall and the new road is choked with car-borne hunters seeking mountain goats, wolverines, grizzly bears, and the elk migrating downriver to their winter range. The elk are moving early, driven from their high refuges by early deep snows, not knowing that their route of travel and the winter range itself have been penetrated by roads. We move to another valley to observe the rutting season as the usually solitary male mountain goats, or billies, join bands of females and subadults for courtship and mating in November.

Now it is winter. Old and new roads are buried beneath snows. Our tent on the mountainside stands inside walls of snow 15 feet deep, and the snow still falls every day. It is 25 miles to the nearest road if you cross the peaks and 80 miles if you ski down the South Fork of the Flathead River valley. We are in another valley three miles from Bunker Creek where our displaced goats have joined another herd. We find that they survive the mountain winter by feeding on the highest ridges where winds whip the snows away, and on walls of rock where they paw to expose grasses on the outer edges where the steepness of the slopes has forced deeper snow accumulations to fall off. We survive by leaving our tiny tent and telescope from time to time to ski through the forests

below or slide like otters down steep slopes in our snowsuits or wrestle and howl with our Malemute dog, Kobuk. And there is always Beth's work of climbing the cliffs with ropes and ice axe to follow in the goats' paths and determine what they have been eating. We both spend many hours shovelling our tent free of the drifting, falling snow. In the snow belt of the Rocky Mountains, it is a long time until spring.

In 1972, we continue to watch the goat herd, and begin to extend our investigations into adjoining mountains and valleys, comparing the status of wildlife populations in roaded and unroaded areas. Evidence points toward road building, logging, and overhunting as major factors in the decline of mountian goat populations in the region. Billy One-Eye, one of only a few large males seen in the area, had lost his eye to a hunter's bullet before we ever knew him. He is killed by another hunter. We investigate hunting and poaching of grizzly bears in accessible portions of their habitat. We are running into criticism and running low on funds. There are moments of happiness; leaping from a hot day into a screaming cold glacial pool, walking on autumn frost beneath the great, golden tamaracks, and learning new stories from tracks across the fresh powder snows; but the mountains have changed. It is a new era; the wilderness has been deposed and its laws amended. The land and its animals are managed now by men and their machines. We are no longer part of the wild community, no longer sharers in the meadow. We stay on as scientists to observe and document, and—to continue.

With a fellowship from the National Wildlife Federation and a grant from Defenders of Wildlife, we expanded our research in 1973 to include a 300-square-mile portion of the Swan Mountains around Bunker Creek. With paid assistants and volunteers, we are censusing mountain goats, grizzly bears, and other species of wildlife throughout the area, attempting to relate wildlife population sizes and distribution to accessibility and hunting patterns. And we are still watching our mountain goat herd and the animals we have come to know as individuals. In July, Number 9 leaves the herd, crosses the South Fork of the Flathead River, and takes up residence 11 miles away. Like other billies, he will pursue a largely solitary existence. Number 4, sometimes called William Goat, returns to the herd during November to court the females. He has developed a thick neck and shoulders as a three-year-old and has assumed the forceful, stamping gait of an adult billy as he moves between groups of females. A larger male rises abruptly from a promontory. He and William trot to meet on a broad ledge. They circle stiffly, faster and faster, until, in a flurry of long white fur and snow, William goat sidles rigidly away downhill, defeated, but unhurt. Number 1 and Number 3 both gave birth for the first time as three-year-olds in May of 1972. Now both of them have produced youngsters again and will at-

"Our tent on the mountainside stands inside walls of snow 15 feet deep, and the snow still falls every day. It is 25 miles to the nearest road if you cross the peaks and 80 miles if you ski down the South Fork of the Flathead River valley."

"The Rocky Mountain goat symbolizes the mountain wilderness. Its decline means that the mountain fortresses are under attack."

tend to them through the winter.

We had hoped to identify the most significant natural sources of mortality to mountain goats. Avalanches can sweep away entire bands of goats, but we only saw them thunder close by the goats, and ourselves. Slips on icy ledges, a foothold loosened by frosts, a single misstep in a lifetime of mountaineering within the most rugged terrain of the Rockies; these accidents must claim at least some proportion of goat populations. Yet in over 4,000 hours of observations, and we saw goats in many frightening climbing predicaments, there were very few falls, and the worst we observed resulted only in limps. We were the ones that hugged the rocks and bruised our backsides. Predators such as grizzly bears, cougars, lynx, coyotes, and wolverines venture onto the cliffs from time to time, and eagles ride the mountain winds past even the most precipitous walls. Still, we saw only unsuccessful chases and hunts. We were the ones that came face to face with grizzly bears, and the golden eagles swept down upon us as they did the goats.

We could be certain only that, aside from hunting, younger goats disappeared more frequently than older animals. We found young goats to be the least experienced and least skillful climbers, yet the most exploratory and enthusiastic. Kids and yearlings tend to negotiate difficult passages in an all-or-nothing fashion which often amounts to a scarcely controlled fall. We could also see that younger goats were the least alert to potential dangers, yet they were the most curious members of the herd. Youngsters are forced to become independent of their mothers after 10 to 11 months. These goats form small yearling gangs at times which roam the cliffs without much apparent purpose other than to jostle and butt each other, harass older, more sedate animals, and explore their home. Yearlings often approached us on the cliffs to peer around the rocks at us and stare at each other in bewilderment. Large mountain goats are capable of a vigorous and lethal defense with their sharp, curved horns, but young goats are less able to defend themselves. Finally, mountain goats do not fully reach adult size until nearly four years of age. Younger, growing individuals require better nourishment than older goats and so may suffer more from food shortages during severe winter storms and long, deep winters.

Now it is 1974. We have watched the birth and development of new kids each year, but the herds in the valleys contain less than a handful of goats where they were once abundant. Icy cliffs, avalanches, predators, and winter storms have no doubt taken a toll. But these are forces which have molded the goat's very form and society since the Ice Ages. Since the mountain goat evolved in spite of and because of these very pressures, it is unlikely that they suddenly emptied the valleys of goats. But there is something new in the valleys. There is suddenly a road winding up each canyon, leading past the fortress walls, nearly to the mountains' crest.

It is becoming clear in our study area that species such as mountain goats, which occupy special habitats, reproduce slowly, experience significant natural mortality, and are readily exposed and vulnerable to high-powered rifles, cannot withstand much hunting pressure, if any, where they have become highly accessible. Mountain goat populations appear to remain perfectly healthy and stable in portions of the Rockies where they have been left undisturbed, though the extent of such areas has been greatly diminished. By contrast, where we have hunted and "managed" the mountain goat, most populations have experienced declines. This animal is particularly sensitive to hunting in accessible areas since it is so conspicuous on its open cliff faces, so curious, and so easily killed. The hunted goat doesn't disappear into a thicket; it merely climbs to a steeper but equally exposed cliff face where it considered itself safe. The "challenge" of a goat hunt consists almost entirely of climbing to reach the mountain goat's home. In our area, however, most valleys have major roads ad clearcuts within rifle shot of the goat cliffs. From such valleys, we watch groups of two or three or four goats where local residents reported 30 and more on the mountainsides prior to logging.

Now that logging roads are being pushed into the last remote timbered areas, the few remaining refuges for goats and grizzly bears and other wilderness species are becoming accessible. The last strongholds, the mountain fortresses, are under attack. In 1971, the two of us found between six and eight different grizzly bears regularly using Bunker Creek and the adjacent valley to which the goats fled during road building. By 1973, intensive surveys of these same areas by five people revealed only one resident bear, and that bear, a small female, was shot during the first week of hunting season.

These animals must have, at the very least, a hiding place, a respite, a hole to crawl into. The Montana Fish and Game Department promotes hunting of these sensitive species, even in highly accessible and newly roaded areas. Since they conduct no censuses of either goats or bears, the Fish and Game biologists must rely entirely on "harvest" or "kill" data to make estimates regarding population numbers. and welfare. This is a curious and self-fulfilling technique. When higher numbers of animals are killed, the agency assumes that there must be more animals than ever still alive. Only when harvests decline do they consider possible population decline. This method can be terribly misleading. As new roads and increases in the number of hunters lead to greater hunting and poaching pressure in previously remote areas, "harvest" success, which is tallied by large districts, can remain high while individual populations are seriously depleted or eliminated. By the time numbers of goats or grizzlies are so low as to yield decreased "harvests" after pervasive hunting, these unique species may have passed the point of recovery, for they don't possess the resiliency of some more widespread and rapidly reproducing species.

The Forest Service continues its policies of road building and logging in those remote high mountain areas and other *de facto* wilderness habitats which harbor these species. Few and insufficient prelogging wildlife inventories are conducted. Of the nearly 200 people employed by the Flathead Forest on a permanent basis, there is only one fisheries biologist and a single wildlife biologist employed only this past year. The remainder are foresters, engineers, and administrative personnel. To their credit, the Forest Service has recently begun to close roads in a few critical areas, but not on a comprehensive basis, and not rapidly enough to keep pace with their search for cheap virgin timber in wild mountain valleys.

These management agencies, the Fish and Game Department and the Forest Service, can't each wait for the other to either stop hunting or cease road building and logging. They must compromise and cooperate to protect remaining habitat and population levels of sensitive wilderness species by regulating patterns of accessibility and hunting pressure.

It is difficult for researchers to be completely objective about animals they have lived with through seasons and years, watching them being born, learning their language, and interpreting their moods and desires. A wildlife biologist is expected instead to concern himself with "kill ratios" and "crops" of animals, the overriding goal being to produce a bountiful "harvest." A wildlife researcher's goals should be to understand animals in their entirety. Through the scientific techniques of calculated observation, experiment, and analysis, certainly; but also through intimacy, sympathy, and even love. Why is it not acceptable to consider from the kid's point of view the emotional consequences of being orphaned? Hunting of all sexes and ages of mountain goats is permitted. The 25-pound kids themselves are fair game. In recent years, more females than males have been killed by hunters in the Swan Mountains. With the death of its mother, the unprotected and unalert youngster must paw and travel through deep snows where it would ordinarily have followed in its mother's path and fed largely in craters she had pawed through the snow. The orphan must learn for itself the system of trails, the location of sheltered winter bedsites, the sounds and scents of danger, and the availability of forage within the range. Of equal import is the social consequence of being orphaned. The undefended kid is often threatened and harassed by older goats in different bands to a point where the youngster finds life more tolerable alone on the icy cliffs, day after day, and month after month. Isolation can be a significant factor decreasing the kid's ultimate prospect of surviving the mountain winter. It not only increases the threat of death from starvation and predation, but it very likely creates considerable stress for a highly social and dependent young animal.

Wildlife managers need to explore all of the other qualities which wildlife species possess besides their numerical status. We should investigate an animal's behavior, social structure, daily movements and activities, learning abilities, and genetic potential, and the effects of hunting and other human disturbances on these qualities. Then, perhaps, we can ourselves evolve from a period of manipulation to one of enlightened management.

The Rocky Mountain goat symbolizes the mountain wilderness. Its decline means that the mountain fortresses are under attack. Species such as the grizzly bear and goat, and we who share their country to learn and simply to behold, can retreat no further. This is the message of the mountain goat which, alone on a pinnacle amidst spires and vaulting cliffs, leaps to a snowbank and dances down the mountainside, spinning, twisting, and tossing its horns. The creature finally stops and long surveys its domain, then beds atop a promontory and is once again the still, white guardian of the mountain's upper realm.

Blue whale, from a drawing by Evelyn Sczuck

THE LARGEST WHALE

By Victor B. Scheffer

The largest of all whales was doubtless a female blue whale in the prime of her life, feeding in the Southern Ocean in March or April at the end of the austral summer. I believe that she was 100 feet long and weighed 215 tons. To persuade you that such an animal did exist, I must lead you through a thicket of figures, though our path will be short.

The Largest Ones Are Gone

Because over exploitation has reduced the blue whales to about six percent of their original numbers, the place to look for records of very large individuals is in the whaling statistics of 40 or more years ago. Surely the oldest and largest individuals are now gone. Ray Gambell, of the Whales Research Institute, London, estimates that the exploitable, or commercially available, population of blue whales has declined from 215,900 to 13,600. Regular whaling for the blue whale began in 1868 in Scandinavian waters, spread to the Southern Ocean, and reached a peak in the whaling summer of 1930/31, when the world kill was 29,606. The member nations of the International Whaling Convention finally agreed to stop the killing of blue whales at the end of 1965. Since then, only a few hundred have been taken, either by accident or by the whalers of non-member nations.

George L. Small of the City University of New York points out that, in the dying years of the blue whale industry, from 1931 to 1965, the average length of adult females in the catch declined from 86 to 73 feet, which is a clear indication that the whalers had become increasingly dependent upon immature animals. Sidney F. Harmer, British zoologist, had earlier foretold the disappearance of the larger animals. "It may be anticipated," he wrote in 1923, "that the enormous destruction which is at present taking place in the South will result in a diminution of the number of [the] large specimens."

The Size of Male and Female

The female blue whale is larger than the male, although the ratio is difficult to ascertain. In the 1920's, before the whalers had agreed to impose a minimum size limit, one harvest of blue whales included 3,712 males and 3,213 females. The average length of the males was 77.7 feet and of the females 81.1 feet; the difference represents a ratio of 100:104. In a harvest in the 1930's, the whalers took 8 males and 189 females 96 feet long or longer. This tells us something about the size difference in sexes, though the figures must be read with the understanding that the population was an exploited one, with an abnormal size-and-sex composition. Furthermore, the figures do not permit us to compare size of the sexes *within age*. The preponderance of long females in the catch could mean, though quite certainly does not, that females live longer than males.

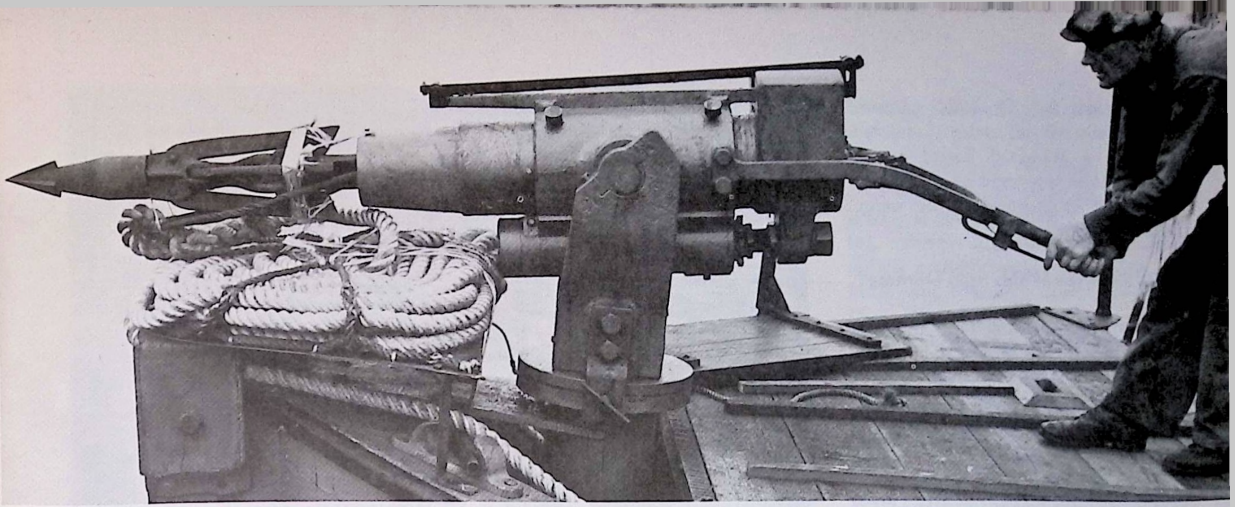
With respect to weight differences, our information is even scantier. The average weights of 15 males and 22 females in a sample were 96.6 tons and 108.3 tons, representing a ration of 100:112.

Why the female should be larger than the male is perhaps the result of biological pressure upon the female to produce a large, precocious calf which can survive in the open sea. During the last two months of gestation, the weight of the fetus increases from about 44 pounds to 5,500 pounds, while during the 6 or 7 months of the nursing period, the baby gains an average of 8.5 pounds an hour!

The Whales Grow Fat in Summer

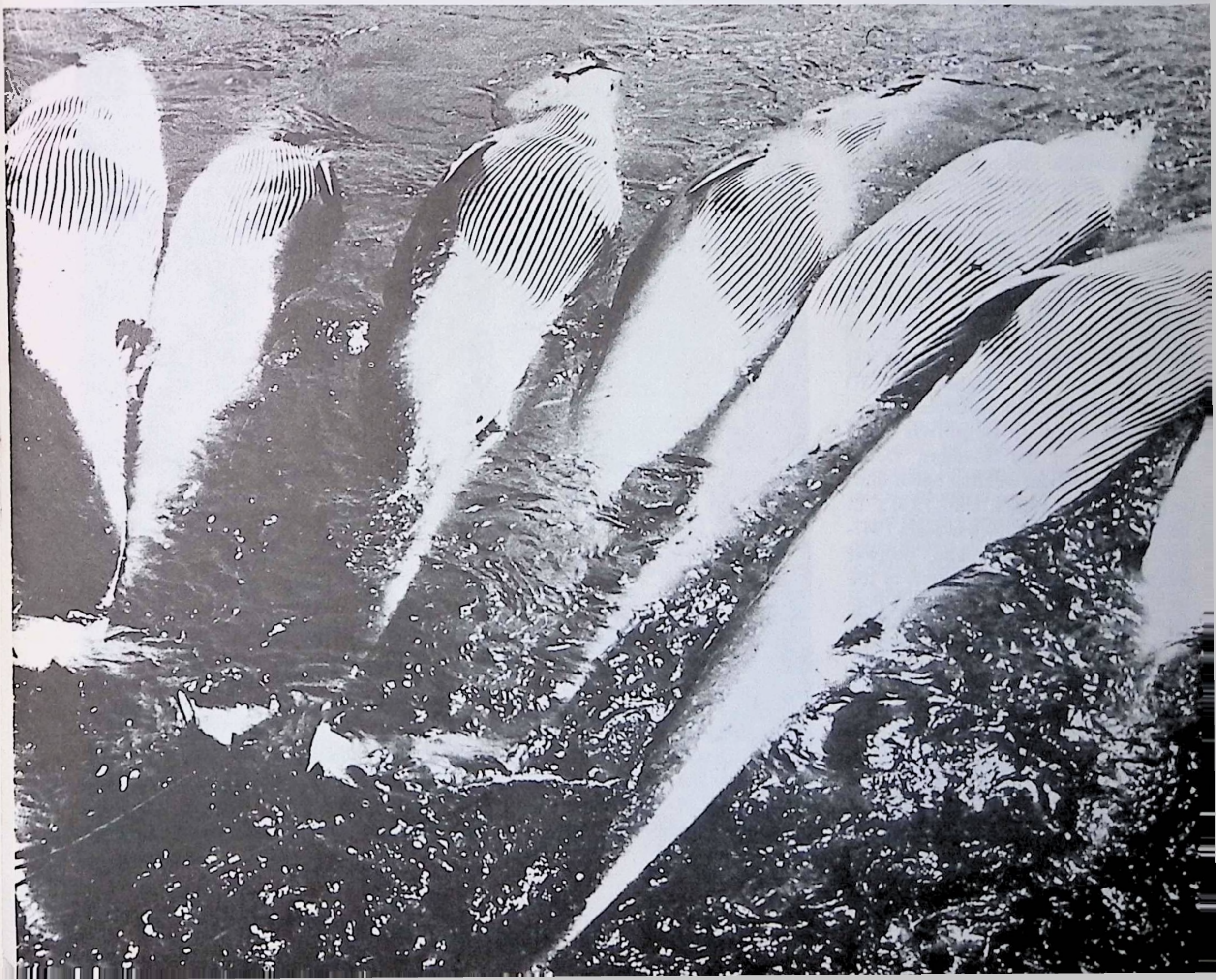
When Japanese biologist Masaharu Nishiwaki weighed blue whales in the Southern Ocean between December 24 and March 7, he weighed them piecemeal. He noticed a progressive increase in the muscle and fat content as compared with the bony skeleton, toward the end of the season. He thus confirmed what was generally known—that blue whales rapidly gain weight, starting about mid-January, while they are feeding in the plankton-rich waters of Antarctica. The gain amounts to about three-quarters of a ton per week per whale during the summer.

For a number of biological reasons, the fat of a whale is a very critical part of its body tissues. From a 91-foot female blue whale at a South African



Gunner on a whale-catcher aims his harpoon cannon. Barbed missile explodes inside the whale, reducing the risk of a staved-in boat. Below, seven baleen whales, pumped full of air, float belly up awaiting factory ship cookers. This whaling scene of the 1930's bears witness of an abundance that no longer exists, due to over-hunting.

Photos courtesy of Victor B. Scheffer



shore station, July 13, 1924, a record 305 barrels of oil were extracted. Assuming a standard barrel of 170 kilograms, the recovered oil would have represented about one-third the weight of the whole body.

When Does the Whale Stop Growing?

No one knows how long the blue whales used to live before the whalers came. British zoologist Alec H. Laurie, after studying the scars (representing the sites where eggs had ripened) on the ovaries of blue whales, concluded that the oldest females were at least 30 years old and were still sexually active. Two of the oldsters that he examined were pregnant. Nicolaus Peters, a German zoologist, examined one old female about 45 years old which appeared to have reached her menopause.

Weighing a Whale is a Whale of a Job

No blue whale has ever been weighed "in the round." All of the known weights have been obtained either by cutting a whale into bits and weighing the bits, or by totalling the number of known-capacity cookers filled with the meat, bone, and blubber of whales at shore stations or floating factories.

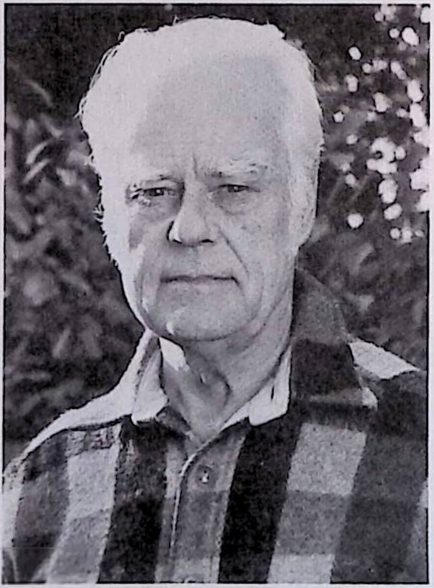
The first weighing of a blue whale was carried out in 1903 on the coast of Newfoundland by Frederic A. Lucas, of the National Museum. The beast was 78 feet long but weighed only 63 tons—evidently a lean specimen.

All subsequent weighings were carried out in the Southern Ocean during commercial whaling operations, either in the 1920's and 1930's (3 weighings (or in the postwar years 1947-1951 (34 weighings). The postwar weighings were a spin-off result of the occupation of Japan by the Allied Forces. General Douglas MacArthur, Supreme Commander, allowed the Japanese whaling fleet to resume its operations in the Southern Ocean with the stipulation that American inspectors accompany the fleet to enforce compliance with international regulations. Fortunately for science, the inspectors arranged for the weighing of certain whales.

Lt. Col. Waldon C. Winston has described the Japanese weighing of a big 89-footer on 27 January 1948, in the lee of Antarctic ice. "This is the story," he wrote, "of the weighing of the largest whale ever weighed—an event that I personally witnessed for a four-hour period during which I kept notes as fast as chilled fingers could write." His companion, Nishiwaki wrote: "Indeed, what a hard job the whale body weighing was. It was carried out in the frigid Antarctic Ocean with storming snows and piercing winds for some hours." Nishiwaki is now a well-known cetologist, and my friend.

Summing Up the Records

The largest blue whale for which both length and weight are recorded was a female brought into the shore station at Prince Olaf Harbor, South Georgia, Southern Ocean, about 1931. She was 29.5 meters long and was calculated to weigh, from the number of cookers filled, 163.7 long tons. After transposing the figures, correcting an error in the published arithmetic, and adding 6.5 percent for loss of body fluids (mostly blood), I arrive at a length of 96.8 feet and a whole weight of 196 short tons.



Kansas-born Victor Scheffer has spent a third of a century studying marine mammals. Last year he was appointed chairman of the Marine Mammal Commission. His books include the famous "year" books: The Year of the Whale *and* The Year of the Seal. *Just published is his* A Voice for Wildlife.

Are there records of longer whales for which no weights were taken? The most dependable data are those of the Discovery Committee, London, whose men measured 711 females in the Southern Ocean in the 1920's and early 1930's. They measured each whale on a straight line from the tip of the snout to the notch of the tail, to the nearest one-tenth meter, by steel tape. The longest whale was measured on March 5, 1926—28.5 meters or 93.5 feet.

Three females reportedly measuring 107.1, 109.2, and 110.2 feet, respectively, were taken in the Southern Ocean in the 1920's or earlier. Sigurd Risting, Secretary of the Norwegian Whalers Association, placed them on record in 1922 and 1928. The lengths were evidently measured in Norwegian *fots*; I have transposed them to English feet. Because the lengths are so very much greater than any measured by the Discovery Committee, I doubt their accuracy.

We are left, finally, with the opinion of N.A. Mackintosh, pioneer scientist of the Discovery Committee and still a respected figure in whale research. In his 1965 book *The Stocks of Whales* he estimates a maximum length of 100 feet for the blue whale. This seems reasonable.

Jeff Breiwick, a graduate student in the College of Fisheries, University of Washington, has calculated a formula from the 37 sets of length-and-weight measurements which I mentioned earlier (the lean Newfoundland beast excluded):

$$\underset{\text{in metric tons}}{\text{Weight of female}} = \underset{\text{(length in meters)}^{3.37223}}{0.00193}$$

Applying the formula to Mackintosh's hundred-foot female gives us a creature of 215 tons. Q.E.D.

There will again be whales of this size if mankind is successful in conserving the depleted and fragmented stocks. I shall not, however, be here to read about those greatest ones, for my generation has hunted down the whales and it will be my grandchildren's generation which (I hope) will see them return.

Grizzly Hunting Curbed

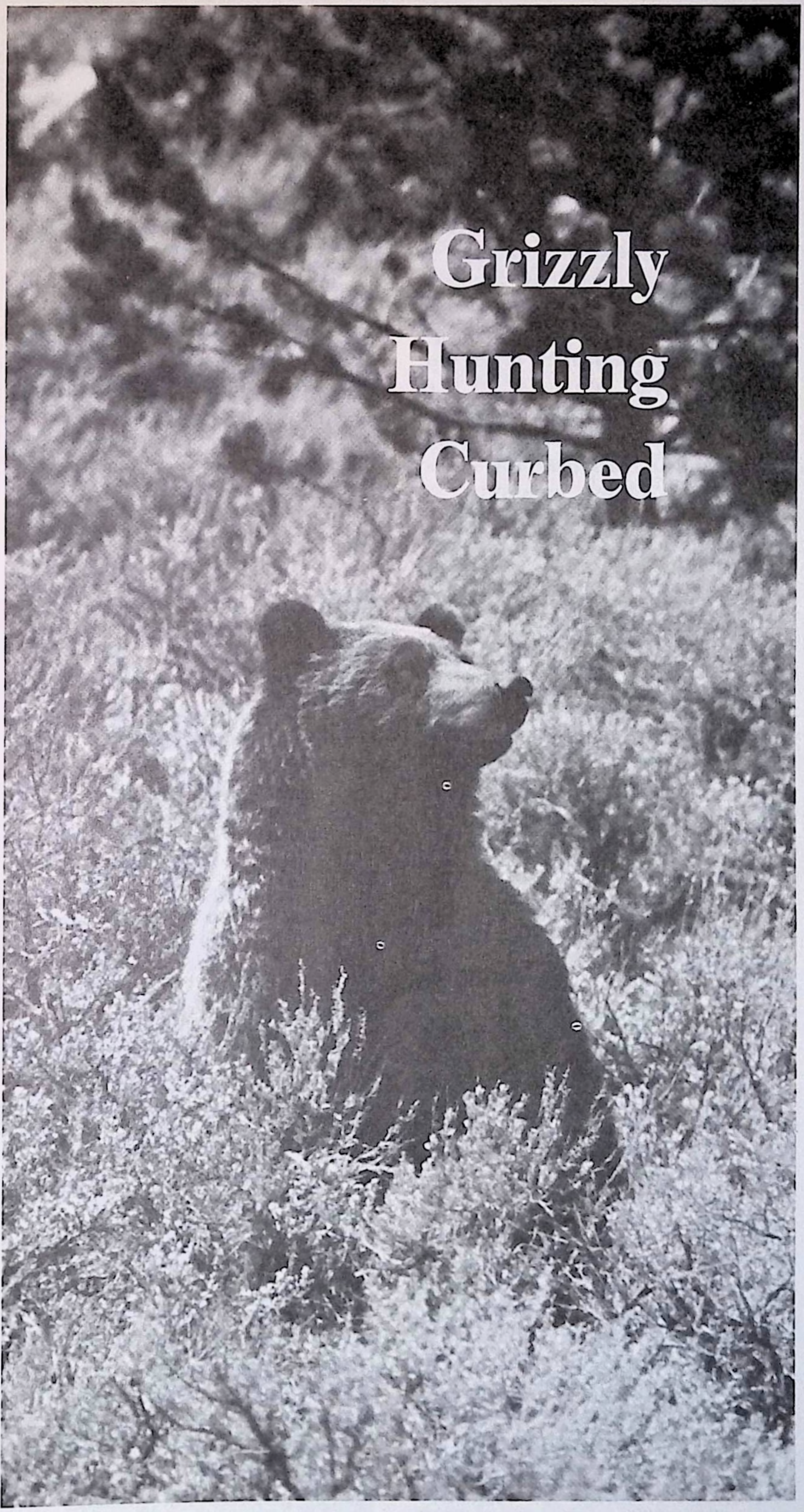


Photo by Steve Johnson

By Aubrey Stephen Johnson

Defenders of Wildlife

Montana and Wyoming, the only states in the "lower 48" where the grizzly is still subjected to sport hunting, recently announced new policies in regard to the grizzly. As of April 30, 1974, the Montana Fish and Game Commission closed three southern Montana hunting districts to grizzly hunting. In closing the three areas (all of which border Yellowstone National Park), Montana Fish and Game Director, Wes Woodgerd, made it clear that department information does not indicate that grizzlies are endangered in Montana. The closure, he said, was a demonstration of department concern for the grizzly and a willingness to take any management measures necessary to protect the species.

Montana Fish and Game personnel readily admit that public pressure brought about by burgeoning concern for the grizzly's survival was the chief factor in the recent decision to close the three areas. There is respect for such concern, and the people and organizations pressing these concerns are recognized as being sincere in their beliefs. However, most department personnel question the legitimacy of such concerns, comparing them to well-intentioned but somewhat misguided juggernauts. One member of the Montana Fish and Game Department put it this way:

"If a truck is coming at you, and you're in the crosswalk, you may be in the right, but the prudent thing is to step aside for now, hoping to be able to talk to the driver later."

Of the two states, only Montana has populations of grizzlies that live in isolation from any national park. Even in Montana, however, Glacier National Park is an obvious boon to the grizzly hunter. Of the 14 hunting units open to grizzly hunting, four of these lie directly adjacent to all of the eastern and southern boundaries of Glacier National Park. Of the remaining hunting units, four lie on the east and west boundaries of the Flathead Indian Reservation, and four more either surround or are part of the Bob Marshall Wilderness area.

In Montana, anyone with a valid big game license may purchase a grizzly tag for use in any area open to grizzly hunting. In 1973, some 810 hunters "harvested" a total of 15 grizzlies for a success ratio of 1.8%. As can be inferred from the low level of hunter success, baiting is not permitted in Montana.

While Wyoming has also been subjected to a great amount of public pressure concerning grizzly hunting, their vulnerability to such pressures would seem even greater than Montana due to two very important conditions.

First of all, Wyoming is dependent upon the presence of Yellowstone National Park for all grizzly hunting in the state. Though Wyoming has other extensive areas of historical grizzly habitat, the combined pressures of livestock interests, hunting, and habitat degradation exterminated the grizzly years ago in most of the state. Today, only Park and Teton counties, both bordering Yellowstone, have any grizzlies left to hunt. Most, if not all, of the grizzlies shot as hunting trophies are wandering residents of Yellowstone National Park.

Secondly, as reported in my article "Shoot a Horse to Kill a Grizzly," in the February issue of DEFENDERS, Wyoming hunts the grizzly almost exclusively with baits—usually dead horses. Thus, not only does Wyoming capitalize on the presence of a wildlife sanctuary, it also allows the use of bait attractants near boundaries of Yellowstone National Park.

Shortly after my article was published, the Wyoming Fish and Game Commission met to consider its course for the approaching spring opening of the 1974 grizzly season. Out of this first meeting came an initial decision to stop *all* bear baiting within the "Yellowstone ecosystem," a nebulously defined zone around Yellowstone National Park. Accordingly, personnel of the Shoshone National Forest quickly defined a boundary for the "Yellowstone ecosystem," attempting to have it follow easily recognized natural features such as watersheds, rivers, etc. This quick action was necessary so that baiting permits would not be issued within this area for the spring grizzly season beginning on April 1, 1974. (Teton National Forest, bordering the south boundary of Yellowstone, requires baiting permits for bear baiting.)

After the baiting permits were issued by the Shoshone National Forest, the Wyoming Fish and Game Commission abruptly and mysteriously decided to allow baiting as usual, but stipulated that grizzlies could not be shot "over bait." Specifically, the Commission approved a regulation making it illegal to take grizzly bears with the aid of "any dead animal, fish or other organic matter used to attract the bears." In other words, baits for black bears can still be placed in close proximity to Yellowstone, and grizzlies can still be shot; but attractants cannot be used.

Enforcement of Wyoming's current regulations regarding baiting will be extremely difficult to enforce. For example, at what distance from a bait lure can a grizzly be legally killed? How does a hunter prove that the grizzly he shot was not lured with a bait, or conversely, how does a game warden prove that bait *was* used? Finally, how many hunters are even capable of identifying a grizzly as distinct from the black bear?

Even experienced observers occasionally have difficulty in distinguishing between the two species of bears. The "black" bear can be almost any other color, as can the grizzly. Occasional grizzlies even lack the distinct "hump" over the shoulders. Since Wyoming no longer requires that all bear hunters be accompanied by a professional guide, lack of such expertise could result in a greater mortality for the grizzly.

The Wyoming Fish and Game Commission has also recommended that a two-year moratorium—effective January 1, 1975—be observed on *all* killing of grizzlies within the state. Under the proposed moratorium, no grizzlies could be killed by anyone for any reason except when human life is at stake. In a state with such powerful livestock interests, it is highly unusual for the Commission to forego the customary exceptions for the killing of "marauding" grizzlies by sheep and cattle ranchers.

There are many Wyoming residents who fear that a grizzly moratorium could be detrimental to the grizzly. Citing the inevitable and eternal conflicts of the grizzly with man, a Wyoming Fish and Game biologist said:

"If we close the season now, one way or another we're going to lose bear, and I would think that we'd probably lose more with the season closed than we would with a number of permits that we can (use to) direct the hunter to problem bears, and take care of the bears that we *know* are either going to get killed through depredation law, through killing sheep, through killing livestock,... and we're going to have bear killed also, moreso in the black market sort of situation if we close the season because you make such a sacred cow out of it. You're enticing those types of people who will do this thing to do it all the more, and they can get the clients, and a tremendous amount of money for it."

(As in 1973, only 12 permits for grizzlies will be issued for the State of Wyoming in 1974. Eight of these are for Park County, and four for Teton County. In 1973, only six of the eight permittees in Park County actually hunted; all used bait; and three grizzlies were taken. No grizzlies were killed by hunters in Teton County in 1973.)

The locations remaining in the states of Montana and Wyoming where the grizzly still exists are significant. They are all either declared or *de facto* wildernesses, small pockets of peace in a clamoring world. On their continued integrity rests the survival of the grizzly within the boundaries of the contiguous United States. The preservation of true wilderness is directly dependent on the intelligent management and control of the impact of modern man. The degree to which wilderness integrity is affected by legal hunting, and by the methods used in such hunting, continues to be a source of controversy.

One thing is certain. The West has no finer index to wilderness quality than the presence of the grizzly.

Watching Humpback Whales

By Faith McNulty

Of all our fellow-mammals, the most remote and the most difficult to understand is the great whale. Its size and the alien element it inhabits cut it off from us both in imagination and as an object of study. It is more nearly possible to feel kinship with a mouse, and a mouse is also immeasurably easier for a scientist to observe. Men have pursued whales for centuries, and killed them with unbounded cruelty and in staggering numbers, without learning much more than the simplest facts about their anatomy and their habits. Most of our knowledge of whales, in fact, has been derived from dead whales. Their giant corpses have been dissected, and scientists have charted their astonishing insides: arteries with the circumference of stovepipes, hearts weighing a thousand pounds, and large, complex brains suggesting extraordinary mental powers. A mass of statistics records the location, the species, the size, the sex, and the reproductive state of virtually all the great whales killed over the last fifty years. If a female carried an unborn whale (and nearly half of the females killed have), sometimes it, too, has been measured before being shovelled into the cooking pots. From these data, cetologists have in recent years tried to figure out how many whales remain in the oceans and how many can be killed annually without destroying the various species for all time. Thus, while there is a large store of vital statistics on past generations of whales, long since converted into margarine and mink food, little is known of the living, breathing animals. This paradox exists partly because cetologists, many of them tied to the whaling industry, have been forced to consider whales primarily as a crop, but also because the great whales present the field biologist with one of the most baffling problems in nature. How do you study a living animal that is usually inaudible and is visible only in glimpses? With all the difficulties, some interesting items have been gathered just in the past few years. The fact that the great whales make sounds underwater, for instance, is a recent discovery, and biologists are now puzzling over its meaning.

When I first became concerned about whales, I, like most people, had never seen a member of their order larger than a dolphin. In fact, I didn't know that there was any way to see a great whale short of shipping on a whaling vessel bound for the Antarctic. But the idea of seeing a whale, of trying to get some sense of the nature of this extraordinary beast, fascinated me, and when I learned that whales can be seen close to our shores I decided to try to see some. Shortly thereafter I was given the opportunity to visit the waters off Bermuda, where humpback whales migrating north congregate in early spring.

The humpback whale is a great, chunky beast, around fifty feet long, with a huge head and a small, rounded dorsal fin, which gives the whale a humpbacked appearance when it dives. The humpback usually has a black back and various piebald patches of white on its underside—a gaily parti-colored whale, with no two quite alike. A so-far inexplicable feature of the humpback is a series of knobs or bumps on its head and jaws and on the edge of its flippers. Each knob sprouts one or two coarse bristles, and it is possible that these function in some way as sense organs. The humpback has winglike flippers, which are sometimes as long as fifteen feet—far longer than those of any other whale. There are humpbacks in both the northern and the southern oceans, and they migrate from the poles to the equator, occasionally following the shorelines of the continents. The humpback is a slow swimmer and can easily be caught by primitive methods; consequently, humpbacks have been hunted not only in their polar feeding grounds but from shore stations along their routes. With these whales attacked everywhere, their stocks all over the world have been reduced to a remnant. As recently as 1963, whalers killed 2,339 humpbacks in the North Pacific and in the 1962-63 season, 270 in the Antarctic. Then, in 1963, when there were few left to kill, the whaling nations agreed to stop the slaughter in the Antarctic. The killing in the North Pacific was not stopped until 1966. By rough estimate, a species whose numbers may have originally been more than a hundred thousand has been reduced to five thousand or so.

The humpback is the most athletic and playful of the giants. It leaps and falls flat on its side or back, smacking the water with a gargantuan splash. Sometimes it swims on its back or turns a whole somersault above the water. A whaling captain, Charles Scammon, writing of experiences in the mid-nineteenth century, when humpbacks were plentiful, described their behavior thus: "In the mating season they are noted for their amorous antics. At such times their caresses are of the most amusing and novel character....When lying by the side of each other, the *megapteras* [humpbacks] frequently administer alternate blows with their long fins, which love-pats may, on a still day, be heard at a distance of miles. They also rub each other with these same huge and flexible arms, rolling occasionally from side to side, and indulging in other gambols which can

This article is excerpted from the book The Great Whales *by Faith McNulty*
©1974 by Faith McNulty
Published by Doubleday and Co., Inc.
The author is on the staff of The New Yorker *magazine, where her story on whales first appeared. Her concern about endangered animals resulted in earlier books on the whooping crane and the black-footed ferret.*

easier be imagined than described." It is perhaps not surprising that such a lively whale also emits the most musical sounds of any whale so far recorded. Scientists listening with hydrophones have discovered that humpbacks sing long, complicated songs that have some of the qualities of slightly mad orchestral music and some of the qualities of a gigantic bird singing in a gigantic birdbath.

My chance for a glimpse of a great whale came in the form of an invitation from Dr. Roger Payne and his wife, Katy, who were planning to record the sounds of humpbacks from a forty-four-foot motor sailer lent them by a yachting friend. On a choppy, windy April day, we set off from a harbor on the east end of Bermuda, heading down along the south shore toward Challenger Bank, where the Paynes had had good luck finding humpback whales on previous trips. On board were the captain, a ruddy-faced Bermudian named Campbell O'Connor; the Paynes; Jane Frick, who is in her twenties, likes to take underwater photographs, and hopes to get some whales; and Oliver Brazier, a quiet Bostonian who is an expert on electronic equipment. Roger Payne is a tall, dark-eyed, boyish-looking man in his late thirties, who has passionate personal feelings about whales and has been crusading to save them.

When Payne found that humpback whales congregate off Bermuda in winter and early spring, he and his wife made a trip there in 1967. They met Frank Watlington, then an engineer with the Columbia University Geophysical Field Station at Bermuda. Some time before, hydrophones had been installed in the ocean offshore from Watlington's office, which is on a rocky headland, to record whatever sounds came along. He had been startled to find that these included medleys of a sort of unearthly singing, grunting, wailing, and rumbling, which he could attribute only to the humpbacks that were to be seen breaching and spouting offshore at the time the sounds were recorded.

Watlington gave the Paynes copies of the tapes, and back home in New York they played them over and over. What impressed and fascinated Payne particularly was the variety of the sounds. At first, they seemed to come in random sequence, but after many hearings he realized that there were definite patterns, repeated from time to time. It occurred to him that these patterns—which could be called "songs" in the same sense that the characteristic sound sequences of birds are called songs—offered a valuable tool for the study of whale behavior.

The next year, the Paynes went to Bermuda again, and, hoping to get close to the whales without frightening them, Payne put out to sea in a plywood rowboat. There were humpbacks surfacing around him, but he could only get about fifty feet from them. When a pair of whales that he had been vainly chasing went down for a long dive, Payne shipped his oars and waited for them to reappear. As he sat there, he suddenly heard whale music emanating eerily from the hull of the boat. Because of the different densities of air and water, very little sound from the depths can escape into the air, but wood is of an intermediate density and can act as a transducer. (Payne points out that whaling literature includes accounts of strange, ethereal music reverberating through quiet ships at night, and thinks that these accounts can be explained as whale sounds transmitted through wooden hulls.) The sounds that Payne heard in his rowboat were not only clear but startlingly similar to Watlington's tapes. "This blew my mind," Payne says. "It was confirmation that not only do individual humpbacks repeat their songs but other humpbacks may sing the same song at a different time and place." His conclusion that there are definite, recurring sequences in whale song was later confirmed by spectrographic analysis. Payne lent Watlington's tapes to Scott McVay, who was then a Princeton University administrator and who undertook to work with him on their analysis. This involved the use of a spectrograph machine, which produces a chart that shows both frequency over a period of time and amplitude, and resembles musical notation. Thus printed out, the separate whale songs are as recognizable as, say, "The Star-Spangled

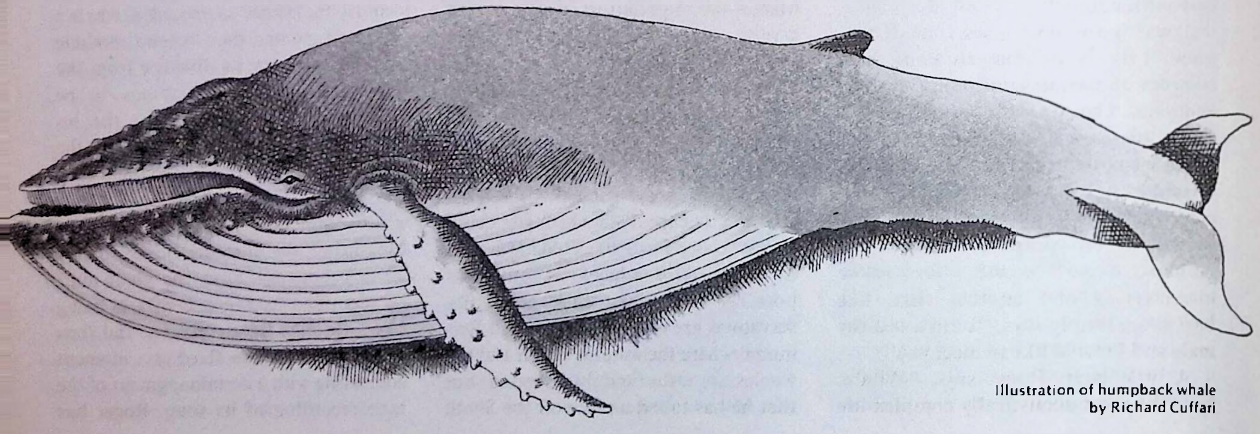


Illustration of humpback whale
by Richard Cuffari

Banner."

When I joined the Paynes on their Bermuda expedition, they warned me that whale-watching can be a frustrating business. Whales appear briefly and unpredictably, they said, and moments of excitement are followed by long stretches of nothing but rough water. My notes on the trip follow, beginning in the morning as the six of us, in the cockpit of the Rockfish, braced ourselves against the surging roll of the waves en route to the banks where the whales are most often found.

Roger explains that his immediate goal is to find out how loud the whale sounds are and how far they can carry—fundamental information that would help explain the function of the sounds. He speculates that the sounds could be a means of recognition between individuals or could proclaim territory, provide contact between migrant groups, or be involved in sex recognition and attraction. Or perhaps some components of the whale's sounds could be used in echolocation, like the sonar clicks of porpoises. Is the song the whale's altimeter, telling it where it is in relation to the surface in the course of a dive? Roger suggests still another theory: "A whale herd is like a convoy of boats, and the whales can't afford to collide. Their skins are very delicate. Maneuvering such a bulk must be like trying to drive a giant trailer truck in traffic. I figure whales have to be alert and communicate rapidly and precisely."

Katy asks, "Is there a sound for left and one for right?"

Roger grins and says, "I wish I knew." He would love to know how complex the communications are, he continues. Can whales convey as much information as a honeybee, which can tell other bees precisely where to find a certain supply of food? Are different components of the whale sounds used for different purposes? Is there, perhaps, one sound for close maneuvering and another that, like bird song, simply says, "I am a healthy male and I would like to meet you"?

A little later, Roger says, "Whales have the most acoustically complex life possible." He wants to know how whales get around in a nonvisual world. The more wide-ranging and unpredictable the life of a whale is, the more need it has to communicate over long distances. The food of whales drifts randomly over featureless ocean, and in order not to compete with each other they must stay far apart while feeding. Roger theorizes that sound frees individuals from the need for close contact, so they can spread out and make the most of the food supply. But, as nomads wandering over vast distances, unable to leave a track or a scent for others to follow, they have the problem of getting back together. "If they can shout information on where they are," Roger says, "then the whole sea becomes an enormous room."

Roger explains that there is something called "the deep sound channel"—a layer of water that confines sound so that it can carry as far as halfway around the world. The sound of a dynamite blast near Australia, for instance, was once picked up by a listening device off Bermuda several hours later. Roger speculates that whales may send their signals over hundreds of miles through the deep sound channel. He is distressed because the multitude of ships churning through the ocean nowadays—there are fourteen hundred in the North Atlantic on any given day—are polluting the seas with noise. The whir of their propellers is on the same sound wavelength as the whales' noises and may mess up whale communications.

I ask Roger what other aspects of whales' lives he wants to investigate. He says he wants to know everything—where they go, what they do at each stage of their lives, and why. "A biologist wants to become part of an animal's life. I would like to be a flea on the shoulder of a bat. That's impossible, but maybe somebody will invent a little capsule in which you could attach yourself to a whale. What I want is to be *with* whales as much as possible." He says that close observations are very difficult around Bermuda, where the water is rough and the whales are rather widely dispersed, but that he has found a place off the South American coast where southern right whales gather in calm water behind a barrier reef and can be watched at close quarters. He thinks that, with enough patience, a human being will be able to get as close to whales as George Schaller and Jan van Lawick-Goodall have got to apes. He thinks that if you hang around whales long enough the older ones will come to ignore you, and you can take advantage of the curiosity of the young. But if you chase, injure, or frighten an animal, he says, you're finished. He has resolved to pursue his studies by methods that don't risk hurting his subjects.

Katy says that one of her objectives in analyzing whale songs is to find out whether individuals can be recognized by their songs—or, if not individuals, then groups. If so, they could be tracked by their songs, and their travels charted. She compares whale song to bird song, pointing out that because birds are so small their lives are speeded up. A bird song lasts only a few seconds—or, at most, a few minutes—and the notes are very close together. She thinks whales sing huge, slow songs appropriate to their size, and that is why each note is so distinct. It sounds to human ears like a record slowed down.

We are chugging along into rising swells, and the horizon is turbulent with whitecaps. Campbell O'Connor, our captain, says it is going to get rougher and now might be a good time to eat. Katy goes below and gets us crackers, cheese, and soup. While we eat, Roger explains how he hopes to gather information on the loudness of whale sounds. He wants to record a whale's voice on tape and then, when the whale surfaces, measure its distance from the boat. There are three things to be measured at the same time: the intensity of the sound as it reaches the hydrophones, the distance to the whale, and the temperature of the water, which influences sound conductivity. Measuring the distance to a singing whale is not easy. First, the whale must be identified as the one that is being heard through the earphones, and then its position must be fixed at a moment coinciding with a certain segment of the tape recording of its song. Roger has thought of various ways to measure the distance to the whale, but fears that some of them would frighten the whale into silence and flight. He has decided to try taking simultaneous pictures from two cameras fixed a certain distance apart, and calculating the angle between the two images. As he snaps the shutter, he will record an identifying number on the tape. The camera rig is lying on top of the deckhouse.

Katy shouts, "Whale!" Roger asks O'Connor to turn off the engine. The boat drifts and rolls in the choppy waves, which whisper and splash against its sides. Only the jib steadies us. Off to one side, there is a round slick, as if a ship had sunk. This is characteristic of a spot where a whale has gone down. Oliver Brazier, the sound expert, puts the hydrophones over the side. Roger, in bathing trunks and earphones, stands tensely in the heaving cockpit, listening, but reports that he is hearing only strumming interference.

"What direction was he going?" he asks.

"East," says O'Connor, pointing ahead. We are about two miles offshore.

Roger says, "I hear a very distant whale."

I picture a vast, green chamber beneath us, and wonder if any person will ever be able to move in it as freely as the whales do. Roger and Oliver are fiddling with the equipment. When they finally decide that the machinery is working right, there is no whale.

O'Connor says, "That whale's got no time to mess with you people. He's gone to sing to his girl friend."

We raise the mainsail and go to look for other whales. We plow through the waves with white foam at our bow. We are all getting impatient, but see nothing except gray waves hurrying past us. Then O'Connor says, "There's one!" and points off the port bow. A second later, I see a whale spout. The spout is like a puff of smoke. It hangs in the air, then disintegrates. It comes again. We lower the mainsail, and Katy throws the hydrophones over. The whale stays under for what seems a long time—actually, it's only a few minutes—and then suddenly rises a stone's throw away. I see a gleaming black back and patches of brilliant white. Then it is gone, in a surge of foam. Roger is on top of the boom struggling with the cameras. Katy says, "I'm getting great sound, but it can't be this whale. It's too far away." She hands me the earphones. They are filled with sound. Mixed with the gurgle and wash of water I hear something like a baby crying very far away. Then the cry turns into a medley of ethereal calls such as tiny translucent fairies might make. Katy thinks we are hearing two or three whales at once. There is an impression, impossible to confirm, of calls and answers. The whale we saw doesn't appear again. What we are hearing *must* be far away. We settle down to wait for another strolling singer. In spite of the jib, we roll and slat as the gray seas come past like rolling mountains. Not far beneath us, there are real mountains, rising from a tremendous depth. They have flattened, mesalike tops that form banks a hundred and eighty feet below the surface. At the moment, I learn, we are over the saddle between Challenger and Plantagenet Banks. The valley floor is three or four thousand feet below the mountaintops, and the slopes are so steep, O'Connor says, that he once dropped bow and stern anchors in this area and found his bow in a hundred and eighty feet of water and his stern in five hundred. I wonder if the whales slide down the sides of the mountains, coasting like kids on snow, and then laze along the valley floor.

I ask how close we might get to a whale. Katy says that one year three whales headed straight for the boat. She jumped in the water with a mask on and, looking down, could see their giant forms and white-banded flippers gleaming right below her. She says she felt awfully small. And once, at the South American whale grounds, she and Brazier were in a small outboard motorboat when a whale came up, raised its head out of the water to peer at them, turned tail and flurried the water in threat, then thrust its flukes under the boat, lifted it into the air, and put it down. As they hit the surface, Oliver started the motor, and they scooted away. Katy noticed that there were two mother whales with calves nearby, and wondered if the whale that threatened them was a bull protecting females. It escorted them from the area. Roger says he had a similar experience when a whale followed his skiff and nudged the stern with its head. "My first reaction was ecstacy," he recalls. "My next was terror."

CALIFORNIA CONDOR

Out of beachless time,
from consecrated prime
came the California condor,
the rise of endless wonder.

Giant of the lustrous realm,
nature's glider near the helm
of man's shattered crown
in shapeless renown.

- Charles Bishop Sweeten

After an hour, no whale has appeared. We pull in the hydrophones and move on. Half an hour later, we haul the mainsail down again and put the hydrophones over. Katy listens, and immediately her face brightens. She says the whale sounds are very loud. Roger begins recording. I listen for a moment. There is a sound like the hinge on a creaky iron door. Then we hear what sounds like a high-low operatic duet. Is it really a duet or one whale talking to itself? Roger would give a lot to know. All at once, O'Connor sees a whale swimming parallel to us. It is surprisingly hard to estimate the distance of a whale from a boat, but this one looks huge and seems close—perhaps only a couple of hundred yards away. It blows. The great, gleaming black back surges out with a swift roll. There is a glimpse of the little fin near the tail, and then the whale is gone. The few minutes the whale is visible are intensely exciting and tantalizing. To be so close to something so enormous and so transient! There is a longing to detain it, explore it, touch it, make some contact—to say or do something that the whale will respond to.

Now there are four whales off the bow, blowing as they move away from us, while closer at hand two black torpedoes cut the water in front of us. The black backs roll out and under. Then three more whales appear, even closer, and they blow twice and make a leisurely turn around our stern. They are visible for a count of twelve. I can see the small eye and the smile at the corner of the mouth. Over the white bands on the flippers the water takes on a turquoise hue, as it does over white sand in the tropics. While these three are circling us, Roger thinks, they are within a hundred feet. We are up to our ears in whales—so many that there is no way to tell which are singing. Katy reports a great medley of sounds. I listen briefly, and hear groans, bleats, moos, even motorcycles starting up and receding into the distance. Now all the whales are gone. We feel left alone, like watchers when a parade has turned the corner, but through the earphones the whales can still be heard singing in the distance.

It is afternoon now, and we have been hearing continuous song for an hour without seeing a whale. This indicates to Roger that either the sound comes from very far off or the whales are staying down a very long time. Katy lends me her earphones. I hear a slightly daft siren song. The sweetest, most poetic notes, pure and piercing, are followed by low ratchet sounds and Bronx cheers. Next, there are haunted-house sounds—Cathy calling Heathcliff. Then a switch to a rural scene—somebody blowing into a jug, beagles yipping, cattle lowing.

I contemplate the endless motion of whales. They go through the water like perpetually turning wheels, doomed never to rest or to form any attachment to a single place. They are Flying Dutchmen. I mention this to Roger. He says that at the South American site the whales loll along the shore, circling there and resting on the current. Sometimes they lie on their backs and wave their gigantic flippers. He says it is a marvellous place to observe whale behavior, because you can stand on a cliff and look right down on the whales. He often saw contact between them—heads touching, sliding over each other. In greeting each other, the whales arch their backs in a peculiar way. He saw a mating. The female, with a calf beside her, lay in the water. The male slid smoothly beneath her, turned belly up, and arched his back. It lasted only a second. There are old reports of whales' mating in a vertical position, rising out of the water belly to belly, but Roger thinks that this is unlikely.

Roger's South American whales are right whales. Humpbacks apparently cease to sing when they move to their northern feeding grounds, where they stay from May to December; sounds have been recorded, but they have not been found to be "songs." This summer silence is puzzling to Roger, but he notes that the whales are particularly scattered then, and it is harder to pick up their sounds. He wonders if perhaps they have been silenced by fear of large, noisy vessels from which recording has been attempted. He thinks it very important to approach whales in a sailboat.

Since whales have a larynx but no vocal cords, we discuss the mystery of how they make their sounds. People emit air to cause sound vibration, but there are other possible techniques—stridulation, for instance. The whale might strum a taut membrane inside itself. Roger, however, thinks it most likely that whales use air, because an air-filled cavity produces a harmonic series similar to whale sounds; namely, even multiples of the fundamental. This theory assumes that the whale transfers air inside it from one cavity to another, and implies the use of some sort of plumbing, probably in the head, for the purpose. Whales have a number of cavities associated with the larynx and the nasal passage which might serve to produce sound—and the sound need not necessarily come *out* of any particular aperture. It could simply emerge through the blubber and skin.

We've just seen a black back wheel out of the water. It is coming toward us, with a smaller one just behind—a mother and a calf. They are so close that as they submerge we again see the water turn turquoise over the gleaming white on their flippers. Their skins shine like divers' wet-suits. There is a wake of champagnelike bubbles, and smooth eddies behind it. The whales blow a deep, long, sighing exhalation, quite loud—first the mother and then the baby—and sink. They surface three more times, moving slowly away. Roger photographs them, but Katy hears nothing on the earphones.

We raise the sail and start for Challenger Bank. When we reach it, we haul down the sail and drop the hydrophones over. Bermuda is barely visible. There is a whale half a mile ahead. Katy hears a distant whale sound over the earphones. On the horizon behind us I suddenly see a cigar-shaped cylinder thrust out of the water to an incredible height, like the lift-off of a rocket. It is a whale standing on its tail. I yell, and everybody sees the giant splash as it topples and hits the water. Katy says the singing she was hearing in the earphones stopped about that time, and Roger thinks perhaps we have seen Katy's singing whale. He has a theory that whales sing when they are near the surface, rising and falling in shallow dives and not travelling fast. He thinks that they lie in the water and sing, and that the sound resembling a ratchet occurs when the whale is coming to the surface for a breath.

After a while, we start moving again. O'Connor says there are fishpots ahead, and predicts that we'll find whales among them. He says the whales like to rub their backs on the fishpots, which sometimes damages the pots' little marker flags and angers the fishermen, who often shoot at the whales. We approach a fishpot marked by a staff flying a penant, which seems a strange touch of civilization in this empty wilderness of water. Suddenly we are in the midst of whales. A pair, with a third whale behind them, surge alongside and blow—one, two, three great sighing, steamy sounds, like those made by a steam locomotive settling down on a siding. I see an open blowhole quivering and vibrating. It is a couple of inches across. Jane has jumped overboard in her bluejeans and is paddling around like a seal, upright in the choppy water, wet hair streaming over her eyes, as she tries to adjust her camera. There is excited activity on board, with Katy and Oliver working the sound equipment and Roger taking pictures. The whales surge by. They surface and sink, surface and sink, with rhythmic, easy roll that has a wonderful grace.

These whales go by very fast. I am reminded of being at the rail of a race track when the horses come swiftly toward you. For an extraordinary instant, they are right beside you, so that you smell the sweat and hear the panting and the creak of leather. Then they are going away. For just such an instant, the whales surface beside the boat and they hurry on past the bow, and abruptly decide to sound. They rise, then dive steeply, seeming to stand on their heads. Their huge flukes wave above the surface like the wings of giant black butterflies; then they sink smoothly into the sea and are gone. The waving flukes are a sign that they are heading for the depths. Everybody seems to feel very frustrated. Jane climbs back in the boat, having failed to get a picture. The deck is a tangle of wires, but the sounds that Katy heard over the earphones were distant ones and could not have been from these whales. Roger has good pictures but no whale sounds to match them.

After a dismal, letdown hour of sloshing around, we motor to a spot near another bunch of fish traps. Roger puts on earphones. He reports that he has briefly heard a whale singing, but it has quit. "I'm afraid we shut it up with the motor," he says. After a minute, his face brightens. "Watch for a blow," he says. "There's somebody close." We watch in vain. Though the sounds are tantalizingly clear, an hour or so passes and we see nothing. Now it seems miraculous that we saw the other whales so close.

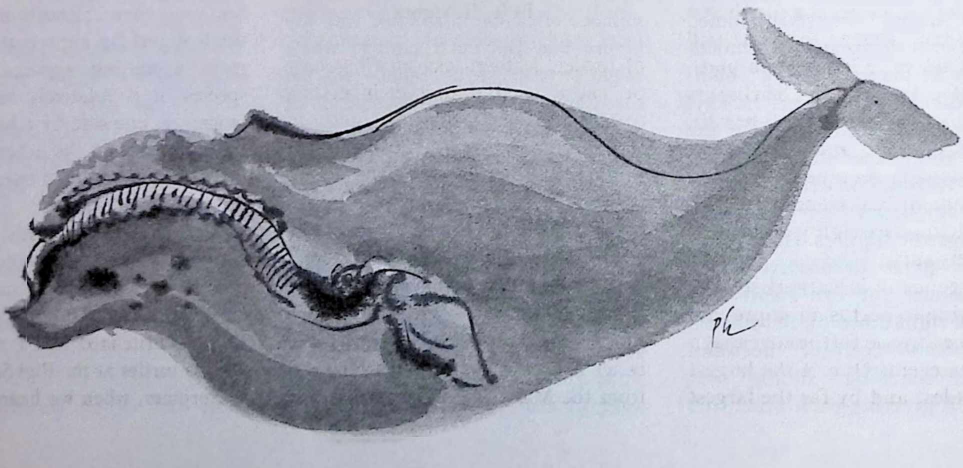
We move again, and as soon as the hydrophones are down Katy reports that she hears some beautiful grunts. She passes me the earphones, and I hear sounds exactly like water chugging out of a bottle. Then comes the siren song. Now I picture dark-green corridors lined with mirrors, and sirens in diaphanous white garments drifting through them. Jane yells "Breach!" and I turn my head in time to see a giant splash a few hundred yards astern. The whale rises again, and almost its entire body is visible. It hangs above the water for an instant and falls with a loud report, amid geysers of water. It vanishes. We wait hopefully, but it doesn't reappear. Apparently, it is also silent. The sounds on the hydrophones are coming from a distance. I hand the earphones back to Katy, who sits watching the water and listening. At intervals, she says, "It's so beautiful!"

My notes on the trip end there, but I remember, perhaps best of all, what came afterward.

For several hours, we drifted over the banks, rolling steadily but less furiously than in the early afternoon. An evening calm was settling on the water. Now and then, we saw a distant spout—nothing close. (Roger suspects that a whale can exhale invisibly underwater and then suface just long enough to take a breath without being seen.) Katy sat in the stern, resting against a pile of life jackets, listening. The sun sank, and the sky and water turned mauve and gray. O'Connor planned to let us drift through the night. He lit the running lights and went below to get some supper. Oliver and Roger went down to work with the recording equipment. They wanted to run the recorder all night.

I sat in the cockpit, watching the light soften and turn silver, watching the ceaseless movement of the water, and becoming aware that our boat was shrinking—that it had become a very small platform to rest on in this endless ocean. As I gazed at the metallic surface of the waves, it occurred to me that in the fifty million years that whales have existed the land has changed beyond recognition but the sea has remained a primeval landscape, and may have looked just like this at the beginning of creation. The sky was empty. There were no clouds to keep us company, and no birds.

Katy put down the earphones and went below. After a moment, I moved to her place and put them on. Whale songs were coming through beautifully. They were lovely and fascinating, but what struck me most of all was that they had the warmth of life. The cold, empty world of the surface dropped away as I dipped into the populated depths. Far from being empty, the great chamber below was filled with life. I relaxed as I listened to its lively hum. It was like looking through a pane of glass, watching busy activities on the other side, yet not being quite able to enter. I thought about the various speculations as to why whales make their strange sounds, and the answer suddenly seemed clear: they sing their songs so that they won't be alone.



LEATHERBACK BEACH

Photo by T. H. Stubbs

By T. H. Stubbs

Washed by the waves of a rough and viscous sea, a large form lies still at the surf's edge, reflecting the platinum light of a full moon. Rearing its massive head, it exhales a deep breath, then presses its nose against the soft sand, attempting to get a bearing on the alien environment. Cautiously it moves forward, heaving its weighty body clear of the crashing surf.

The emergence of a leatherback sea turtle preparing to nest is an impressive occurrence for anyone fortunate enough to witness the event. One of the largest of living reptiles, and by far the largest of turtles, leatherbacks may regularly be encountered during their nesting season on few beaches, and in significant numbers on only two. One of these is the nesting beach of Trengganu, Malaya, once thought to be the world's major leatherback site, where 80 or so turtles may be seen on a productive night. The other, made widely known to biologists only seven years ago, is a fifteen-mile strip of beach in French Guiana, stretching east from the Marowijne River, which may host more than 250 nesting females on a single night! An appropriate site for so great a nesting aggregation of this species, it is relatively remote, being lapped on one side by a hostile, shark-filled sea and on the other by a nearly lifeless swamp of dead trees rising from stagnant, tepid water.

The discoverer of this beach, in a scientific sense, is Dr. Peter Pritchard, then a graduate student under Dr. Archie Carr at the University of Florida. In 1966 Pritchard and I were tagging marine turtles at the Bigi Santi Reserve in Surinam, when we heard rumors of incredible numbers of leatherbacks nesting on a beach in French Guiana, only a few miles to the east. We received the stories with deliberated skepticism, since our tagging efforts at Bigi Santi were netting only one or two leatherbacks each night, and the only beach then known to harbor that species in any numbers was the one at Trennganu.

But while a biologist may learn that most "unbelievable" stories are just that, or at best exaggerations, he is still usually driven by an inherent curiosity, fortified with the substance of hope, strongly enough to investigate exciting possibilities. So the next summer, when Pritchard had an opportunity to explore the coast of French Guiana, he did so. After several mishaps and a few discomforting hours at sea in a large dugout canoe being jostled by huge sharks, he and his companions, Dr. J.P. Schultz of the Surinam Landsbosbeheer (Forestry Service) and the anthropologist William Greenhood, arrived at the Mecca for gravid leatherbacks. From this beginning he initiated the most thorough program of tagging and measuring ever undertaken with leatherbacks, and has continued it every year since, as special investigator for the Marine Turtle Group of the IUCN. Although now associated with the Florida Audubon Society, his research with sea turtles will not be abandoned.

In the summer of 1971, I returned to the Guianas with Dr. Pritchard and his stunning Guyanese wife, Sibille. We intended to spend three weeks camping on the beach, accompanied only by Ernest, a Carib Indian from a small village, Awara, which is separated from the beach by the expanse of dead swamp and the Mana River. Sloshing ourselves and a leaky canoe filled with various equipment through the slimy black mire of the swamp, we safely reached the sandy ribbon of beach, to be greeted by the Atlantic's roaring as it chewed at our narrow refuge of dry land.

We made camp where we landed, on the western end of a wide beach about a mile long. Although the beach continued west to end at the mouth of the Marowijne River, it was narrower and broken by stands of mangroves reaching the water's edge. We could see that the beach was interrupted on its eastern end by a dead forest, a gallery of tall, limbless spires where once there had been green jungle.

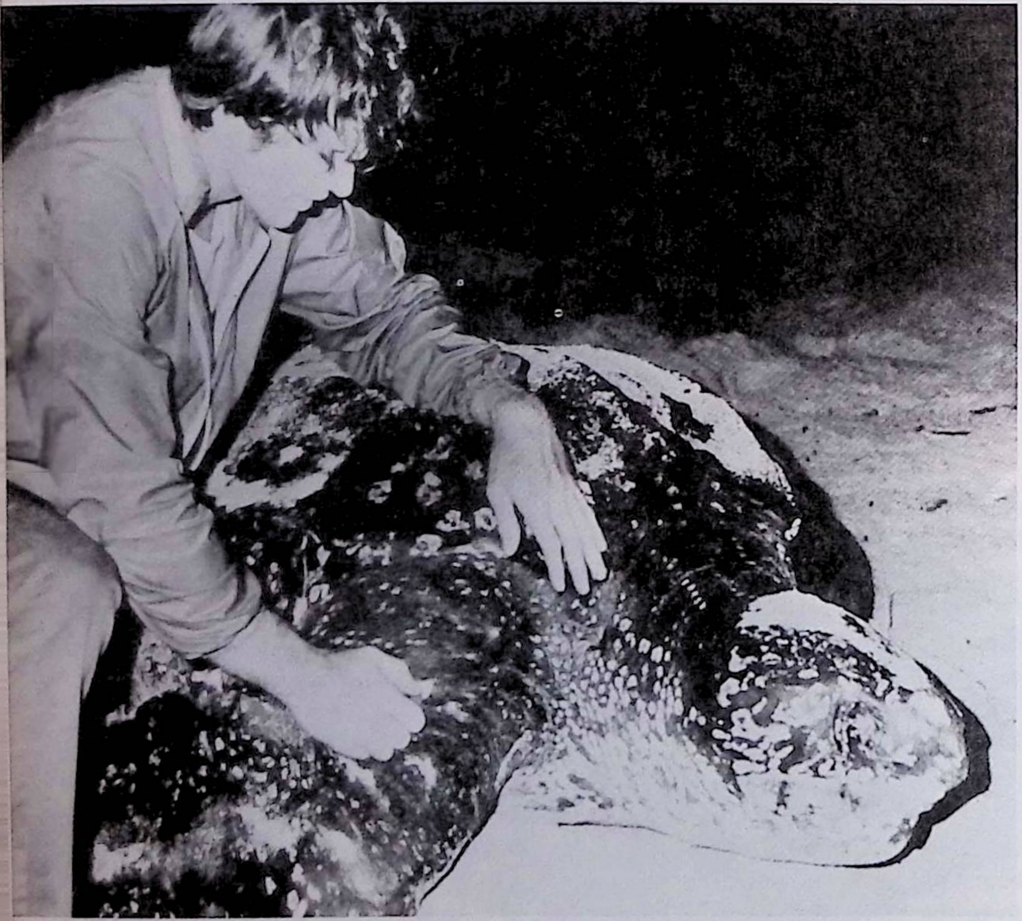


Photo by Peter Pritchard

Author intercepts a leatherback to tag its foreflipper.

That section of French Guiana's coast is given to rapid changes, being underlain by a relatively unstable clay base, causing huge tracts of land to sink into the sea. Thus the dying swamp and dead forest, forming an unusual landscape almost disquieting in its barren aspect.

The first night we remained in camp. The second evening came, and the moon flooded our world with its silver light, glimmering on the phosphorescence of breaking waves. Peter and I left Ernest to assure Sibille's safety and headed east. The previous year there had been numerous turtles on that section of beach, but we saw none, passing only a few tracks on females already returned. Soon we arrived at the dead forest, which had been living the previous year.

"The main turtle beach should only be another fifteen or twenty minutes from here," Peter assured me.

As we walked among the towering spires, waves rolled up to our feet, trickling into the swamp. The moon's diffused light created an eerie effect, accentuated by the skeleton of the drowned forest, some of its trunks 50 and 60 feet high, yet without any living vegetation in sight. Soon we were shielded somewhat from the sea, by an almost impenetrable wall of tangled root systems, broken only by a few random spaces.

It was not a healthy environment for turtles. A stench sprang to our nostrils, drawing our attention to the decaying body of a leatherback wedged among the mesh of roots. She had unfortunately encountered a space wide enough for crawling in, but had doomed herself in the process.

After an hour of walking through this terrain, we were on a uncomfortably narrow beach, and still, as far as we could see, the spires loomed, casting moon shadows over the sand. Stifling the desire to return to camp and pursue further investigation during daylight, we continued. And within 15 minutes the beach had widened considerably. Half an hour later the arboreal cemetery was behind us and a broad expanse of open beach beckoned ahead.

It took only a few minutes for us to determine that there would be no scarcity of leatherbacks, the beach appearing as though it had been the target of a bombing reconnaissance! Everywhere there were nest craters and piles of sand, often laced with turtle eggs uncovered from prior nestings.

Our technique for tagging the turtles was honed to a precise method, allowing us to operate independently on busy nights. If a female leatherback is already engaged in laying eggs, her attention to that undertaking is rapt, so the application of a metal tag to one of her foreflippers usually results in only a twitch. But if not, her reaction is often an energetic return to the sea.

It is difficult, although not impossible, to halt the progress of a reptile weighing as much as a thousand pounds or more, especially when it is an alarmed turtle fleeing back to the surf. Sea turtles can move with unexpected agility, covering any pursuers with sand and water. When that happened, it was still possible to obtain measurements and to affix a tag, often by sitting on the turtle's back, a position not without drawbacks since the hurried movements of a leatherback are akin to short, bouncing leaps. But aside from having to dodge the heavy flippers, there is no danger in associating with leatherbacks, since they are never inclined to bite.

Stapling a metal tag into the loose skin of a sea turtle's foreflipper probably causes only minimal discomfort, if any, and it is still by far the most effective way of tracking sea turtles' wide-ranging ocean voyages. Of those leatherbacks tagged in French Guiana, five are known to have traveled over 3,000 miles. The most long-distanced traveler turned up off the coast of Ghana. The other four were recorded from Texas, South Carolina, northern New Jersey, and Campeche, Mexico.

For many years the uncanny ability of sea turtles to travel long distances, returning during the spring and summer to nest at specific beaches, has been a puzzle of great interest to biologists. Leatherbacks may well take high honors in this area, swimming thousands of miles away, yet somehow returning to a precise beach to nest. Although no such data is available on leatherbacks, studies of green sea turtles *(Chelonia mydas)* in Costa Rica suggest that they often return to within an eighth of a mile or less of the previous year's nesting site. While the migration feats of sea turtles are almost surely accomplished by multiple sensory input, the logistics involved are still under study, few positive answers having been offered.

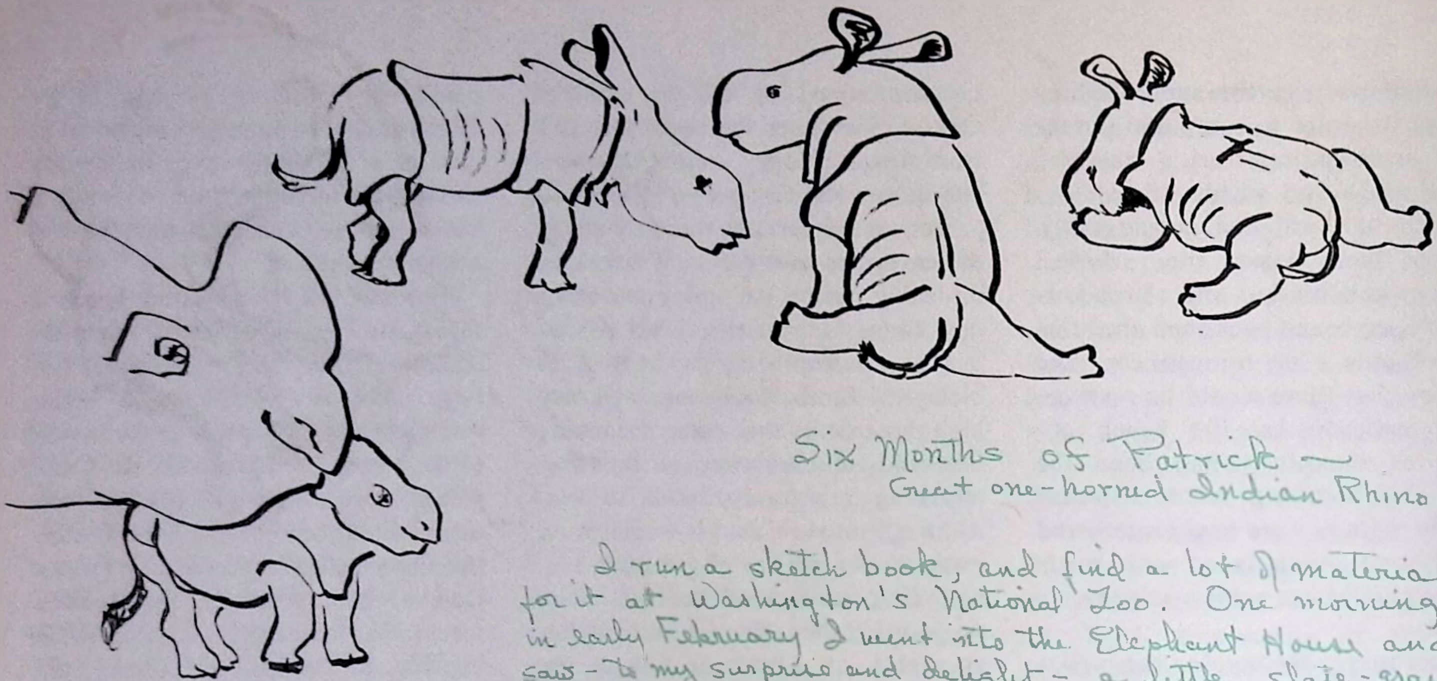
No sea turtle species could be considered entirely safe, since both adults and eggs are liable to efficient and excessive exploitation due to the restrictive nature of their nesting grounds, but leatherbacks are perhaps the least endangered, presently, for several reasons. The flesh is edible but not desirable, so relatively few are killed for food. In Trennganu, almost all eggs are dug, but conservation officers have been buying them back and releasing young each year, though only a small percentage of the number that could be expected to hatch under normal conditions is saved. A species can be exterminated as readily by collecting its eggs as by killing adults, so protective measures in that area are imperative. In French Guiana, the turtles nest on so remote a beach that egg collectors have been a negligible problem.

However, the main nesting beach is rapidly submerging under the relentless Atlantic. During the summer of 1973, large numbers of leatherbacks began nesting on a small beach in the mouth of the Marowijne River near the Carib village, Awara, a move placing their nests within easy reach of the Caribs. But all sea turtles are protected in French Guiana, and generally the Indians seem to be respecting the law. A further impetus to leaving the turtles unmolested is that already tourists have been attracted to the site, and the Indians benefit from the tourism. So in this case, as with the Galápagos, the influences of tourism may prove an asset in conserving a species.

For the time being, the future of leatherbacks appears *relatively* secure. As with many species, however, their present status is by no means inalterable. Were most or all of the French Guiana population to shift their nesting to the beach near Awara, and were the ban on egg collecting lifted for some reason, future adult populations could rapidly be reduced to a small fraction of their current size. Their security is, then, contingent upon the enduring interest of conservationists and laymen being subject, as so many species presently are, to the dubious stewardship of Man.

Leatherback lays eggs in a nest of sand.

Photo by Peter Pritchard

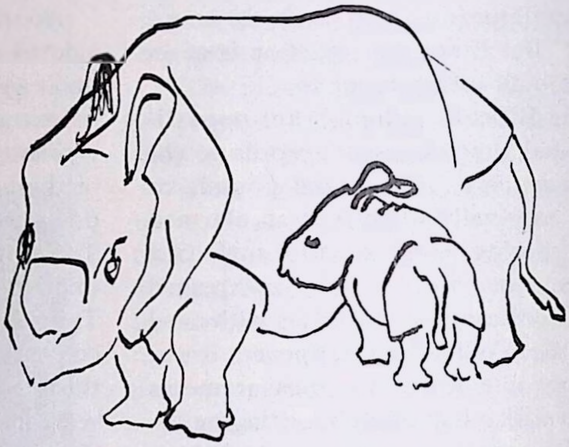


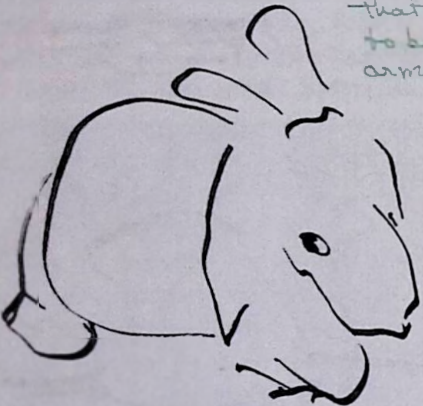
Six Months of Patrick —

Great one-horned Indian Rhino

I run a sketch book, and find a lot of material for it at Washington's National Zoo. One morning in early February I went into the Elephant House and saw – to my surprise and delight – a little, slate-gray rhinoceros following his behemoth mother. This was Patrick, son of the female Rajkumari and male Tarun. He was then exactly ten days old.

Feb. 9 - Like other babies, he's both thin and plump. The ribs show, but the skin is already marked with the folds that make the adult seem to be wearing plate armor. His gait is an

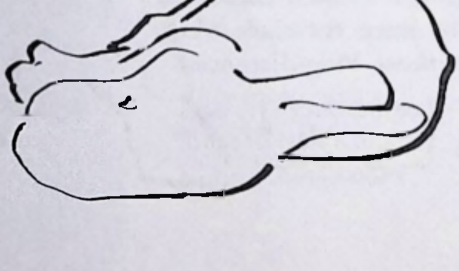


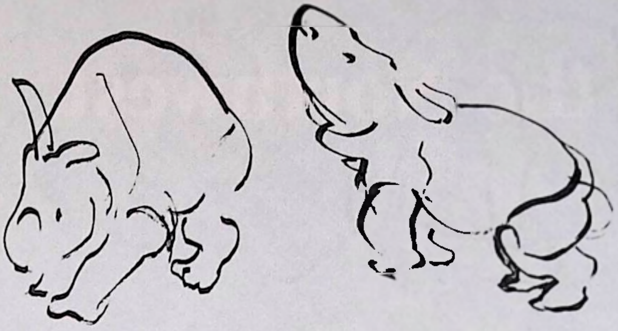


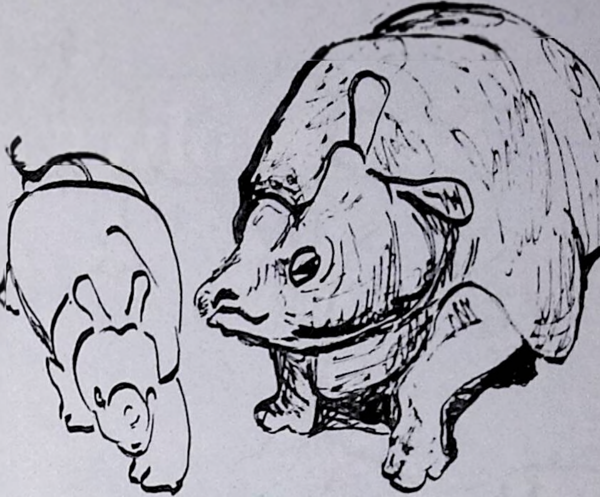
infant's toddle, and when he's tired he squats or sprawls, legs out.

March 2 - He is solider and stronger, and he can run – a regular, hind-legs-pumping rhino canter. Sometimes his mother races with him to the satisfaction of all concerned. Patrick swishes his tail, peers over his shoulder and away he goes. When he's tired he flumps flat.

Patrick, conceived Sept. 1972, born January 30, 1974, weighed 125 pounds. As a Rhinoceros unicornis - first live birth of his species in the western hemisphere.

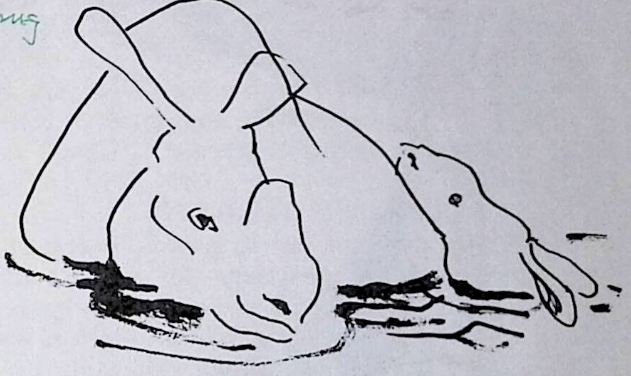






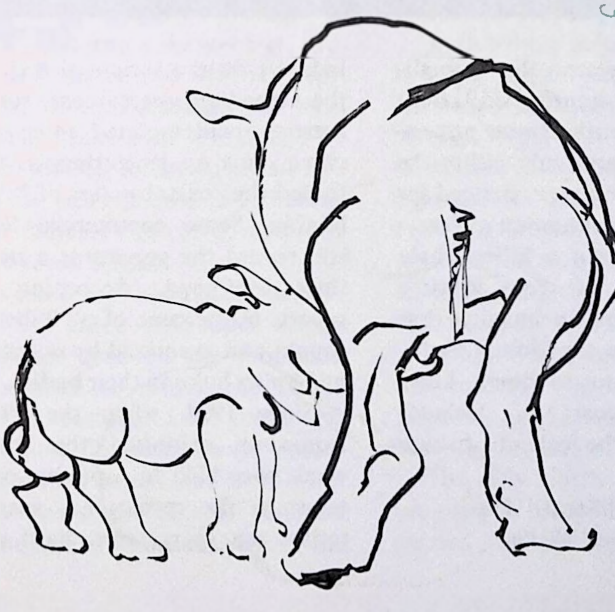
notes and drawings by E. Wagner

For awhile I was away, and when I visited him next in late July, he was almost six months old... sturdier, bigger, and much enjoying a new sport: swimming in the pool of the outdoor enclosure.



July 27-31 He submerges and comes up flicking water from his ears, paddles all around his mother and then tries to use her as a raft. There is - and has always been - a lot of interaction between them. He tends to stay pretty close tho' he'll run the circuit of the yard on his own. At times either will go to the other and touch face against face - a gesture that conveys to watching humans both concern and affection. For all her great bulk, the mother never crowds him too tightly into corners.

The great one-horned rhinos belong to an endangered species. Their marshy homelands in northern India are being drained for farms and settlements. As habitat contracts, their numbers dwindle. If this success in breeding young in captivity can be continued here and in other zoos, there is hope that these magnificent creatures will not vanish utterly away.



First part of a two-part series

Sea Wolves of the Northwest

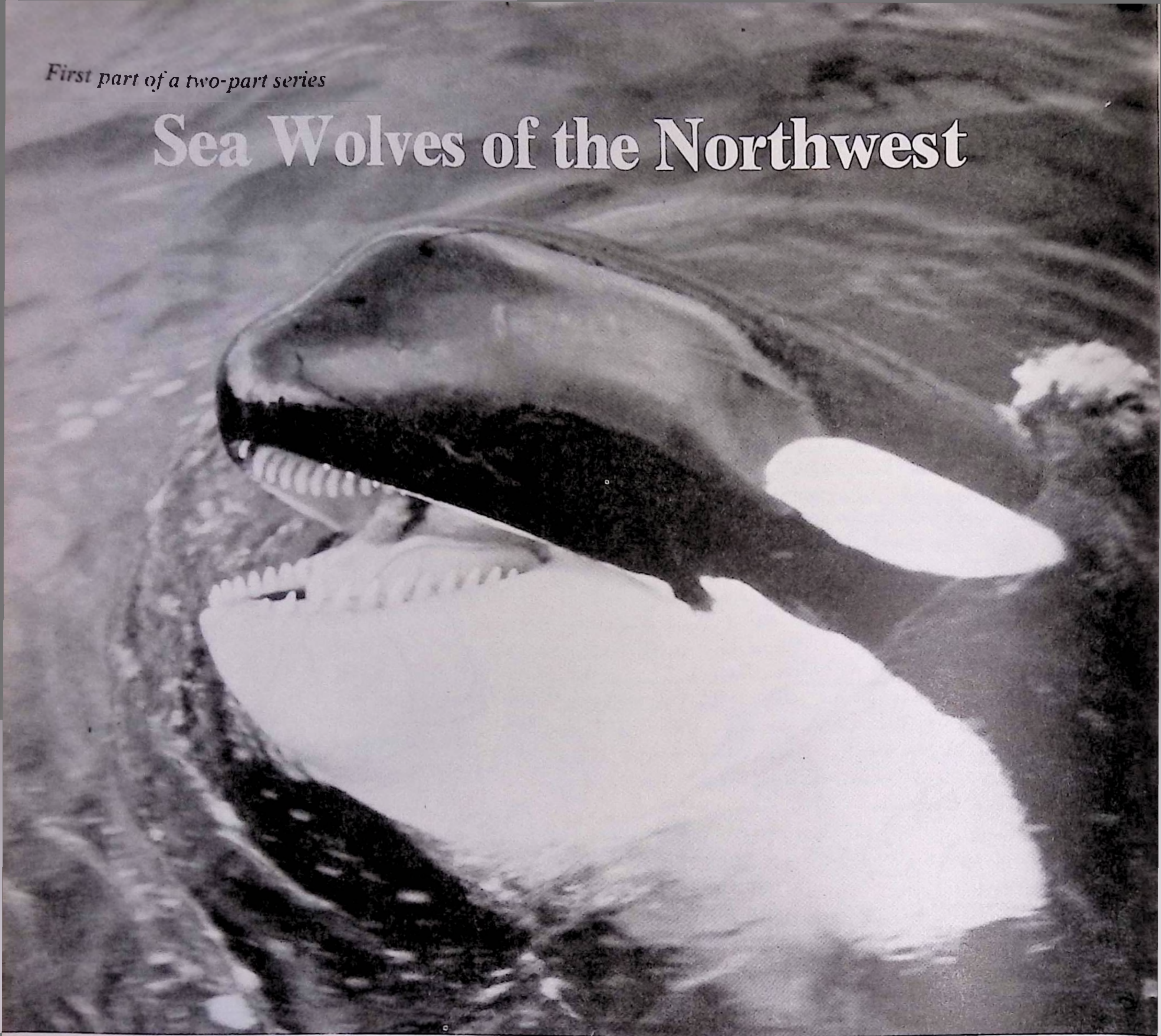


Photo by J. F. Colby

To the Indian tribes of the coastal Northwest, they were the ultimate symbol of strength and power. At death, famous hunters took on their bodily form and cleaved the cold gray waters forever. They were prominent in art and folklore, and in the words of one Indian who had carved their images from cedar for most of his life, "Killer whales are one step above God."

Another Indian legend seems particularly significant for our time. In it, wolves can readily change to killer whales, while killer whales can just as easily become wolves. Both species are beautiful, highly intelligent, and as social animals represent the embodiment of cooperative hunting skill. Both suffered until recently from an extremely bad press, and only within the last decade has their image changed for the better in the eyes of human society.

When one has seen a killer whale cavorting in one of Sea World's aquariums, it is hard to imagine that only a few years ago the United States Air Force had plans to bomb killer whales off the coast of Iceland, allegedly to protect the Icelandic fishing industry from a serious threat. Or that the Canadian government, for similar reasons, contemplated mounting machine guns on its cutters as they patrolled the coastal waters of British Columbia. Some commercial fishermen still regard the species as a menace to their livelihood. According to one report, 60 percent of all killer whales caught and examined by scientists have had bullet holes in their bodies.

By Raymond "Sandy" Davis
Defenders of Wildlife

Since 1964, when the Vancouver Aquarium exhibited the first killer whale ever held in captivity, public interest in the species has soared. Yet today, ten years later, hard scientific data on killer whales are almost totally lacking. Just what, if anything, is known about them?

First, with their pattern of bold, black-and-white saddle marks (paler and grayer in females and young), killer whales, *orcinus orca*, are among the most striking mammals on earth. With its triangular, six-foot high dorsal fin thrust up from the water, a large bull killer whale cutting though the surface of the sea calls to mind the hull and conning tower of a Polaris submarine. Killer whales can attain a length of nearly 30 feet and a weight of nine tons, making them the largest of all carnivorous mammals. They are highly social animals, traveling in herds—called "pods" in the case of this species—which may vary from two to 40 individuals. Killer whale diets lean heavily toward fish and squid, but in the northeastern Pacific region seals, sea lions, porpoises, and whales are relished when they are available. One marine biologist recently saw an entire herd of harbor seals swim full tilt up onto a gravelly beach in Puget Sound in order to escape a pod of killer whales.

In May, 1964, a Canadian biologist, David Hancock, and two companions spent over three hours observing the hunting tactics of a pod of seven killer whales in Barkley Sound, Vancouver Island, British Columbia. Their prey: a 27-foot minke whale. The pod consisted of three adult males and two females, each with a calf.

When first noticed, the minke whale was swimming rapidly through a narrow channel into a shallow bay, surfacing every one or two hundred feet. Three possible exits from the bay were unnavigable because of low tide. The bull killer whales, following about 600 yards to the rear, entered the channel next. The females and calves remained about 300 yards behind.

In the small bay, about 150 yards in diameter, the three male killer whales barred escape through the west exit, then proceeded to attack the minke whale. The females and young remained about 75 yards away, watching. The attack lasted about 45 minutes and was a remarkably subdued affair. The minke whale rose out of the water twice, but the systematic killing process took place well below the unruffled surface. Every few seconds a killer whale would emerge briefly, then dive to return to the fray.

When the butchery ended, the females and calves joined the males to feed on the sunken carcass of the minke whale. No blood was seen in the water, but the entire bay was covered with a film of oil. The three men later recovered fragments of flesh and tongue from the top of the water.

The following day the carcass of the whale floated to the surface and was towed ashore where Hancock examined it at length. The animal apparently died of drowning, induced by shock and the exhaustion of its struggles. The tongue had been eaten, but the blubber and flesh were hardly touched. Instead, the killer whales had literally peeled their prey like an orange, devouring the entire skin!

While ranging across all the oceans of the world, killer whales are most abundant in the colder seas of the higher latitudes. In tropical waters they have been observed to dive frequently to the cooler depths. They are exploited commercially by the Norwegians, and off the coasts of Asia, where they are sought for oil and meat and as a source of fertilizer. The Japanese may take about a hundred killer whales a year; but since nothing is known of the species' numbers or migration patterns, it is not possible to appraise the impact of this figure on the total population.

At this time, no killer whale research is being carried out in United States waters. In 1972 some $250,000 was earmarked largely for this purpose, to be administered by the Marine Mammal Division of the National Marine Fisheries Service, but the money was siphoned off in other directions, and a federally funded study is yet to get off the ground. A killer whale project probably will be under way soon under the auspices of the University of Washington, Seattle, but this is still in the planning stages.

The only North American research program actually in progress is being carried out by Dr. Michael Bigg, a young biologist on the staff of the Pacific Biological Station of the Canadian Department of the Environment. The Station is located on the shores of Departure Bay, a pleasant wooded cove with a village of the same name on the southeastern coast of Vancouver Island. On May 23, 1974, I had a conversation with Dr. Bigg in his office. Some of his salient comments on the killer whale in Canadian waters now follow.

Dr. Michael Bigg: "In British Columbia the killer whale is a very special animal. We have the most abundant of all the stocks in the eastern Pacific. This is the area where killer whales are actually caught, but we still haven't answered a major question: Where do you go where you can be sure to see them? We just don't know much about their behavior, but at least we're working in an area where they're abundant.

"One of our main goals is to see that killer whales are not overharvested for the aquarium trade. So we have to get some accurate idea of their numbers. People really want to see them in the wild, so British Columbia is going to make every effort to see that they're properly managed.

"It's also very important that we find out something about their seasonal movements—where they go at different times of the year. This is where behavior studies are vital. We need to find out more about group composition. Are we dealing with family groups or temporary aggregations? By capturing a whole group is a complete family being taken? So we have a social animal, but don't know anything about its group behavior. This means we can't answer another important question, how to determine how many whales can be captured for educational purposes.

"We know that we have a lot of killer whales, but you can't just go out and expect to see them anywhere. We have to continue the process of educating people—telling them, for example, that their boats aren't going to be attacked by killer whales.

"Although we don't have any exact population figures, it's probably safe to say that British Columbia has several hundred killer whales in its offshore waters. They don't number in the thousands, and they don't number in the dozens. Now this is an unharvested population. Killer whales around here were never exploited by a commercial whaling operation. They are too hard to catch, and they don't have any blubber, so they just weren't economical. But they are taken in small numbers in other parts of the world, usually off the edges of continents. Killer whales stay mostly within 200 miles of shore.

"Killer whales are really the largest of the dolphins. It's interesting to note that work at the Stanford Research Institute indicates that they are the most likely of all cetaceans to have a language. They seem to have two kinds of sounds, ranging from a really low frequency to something way above our own hearing ability, or audible range. One sound is used for echolocation. It's a series of clicks or pulses that sounds like a radar signal. These clicks are made in the nasal passages and go out through the 'melon,' and oily sac over the top of the upper jaw, in front of the blowhole. The oily substance focuses the sounds, which bounce off an object in the water and then come back through the lower jaw. The ears, as a rule, aren't used.

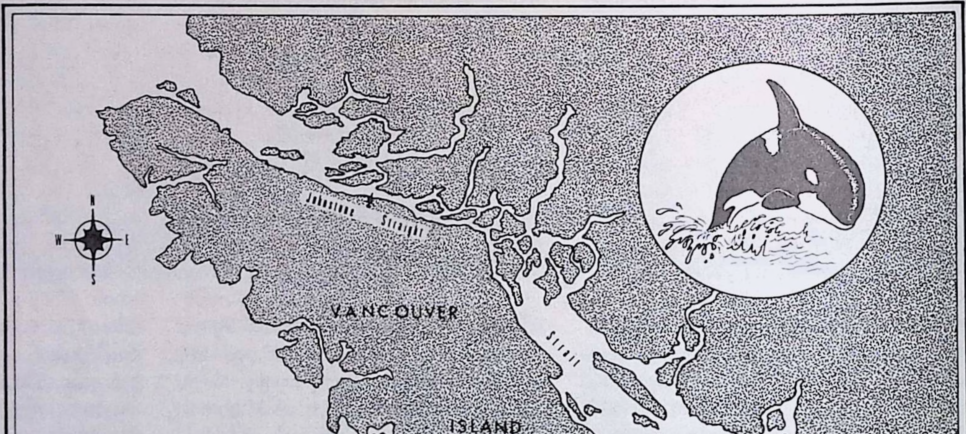
"The other sound might be called a 'scream,' and really consists of a rapidly speeded-up stream of clicks. This appears to be actual communication, with a probable range of between five and ten miles. Killer whales probably can't communicate over the immense distances that have been observed for the big baleen whales. The big whales have powerful low frequency sounds that carry for hundreds of miles, maybe more.

"Over the past ten years or so, attitudes towards the killer whale have really changed in British Columbia. The whales are no longer considered just a nuisance. Through education, people have come to consider themselves really lucky to see them. Killer whales do take some commercial fish, but we don't have any hard data to give us any idea of the extent to which this goes on. They do seem to follow fish stocks during migration, moving in with the fish, moving out when they leave.

"The young killer whales feed mainly on fish and cephalopods—the squid and octopus. It's the big fellows—the adult bulls and cows that attack seals and sea lions. But even then, other marine mammals are probably a secondary source of food.

"Getting back to one aspect of education, about 67 killer whales have been captured for zoos and aquariums between 1964 and 1973. Killer whales are now the most prestigious exhibit that any aquarium can acquire. People really flock to see them. They are money-makers for the aquarium and a thrill to the public. Because of the intense interest that was generated by killer whales, beginning primarily with Namu in the Seattle Aquarium, the heat has really been on to catch them. And you should remember that all these animals came from the Strait of Georgia, that is, between Vancouver Island and the mainland, and Puget Sound. So now a legitimate worry has developed about whether or not the animals might become overexploited.

"Where research is concerned—to talk a little more about that—our main



Killer whales range the coastal waters of British Columbia

Map by Charles Ewing

problem is to find the animal. To help with this, we've had three summers of public censuses. These will help us to know where to go to find killer whales. It started with a one-day census on the 26th of July in 1971. We circulated 16,000 questionnaires and saw that they got out to every marine outlet on the British Columbia coast. The instructions simply were to fill out the form and send it back to us. The questions, basically, were these: Where did you see killer whales? How many were there? What time of day was it, and what direction were the whales traveling in?

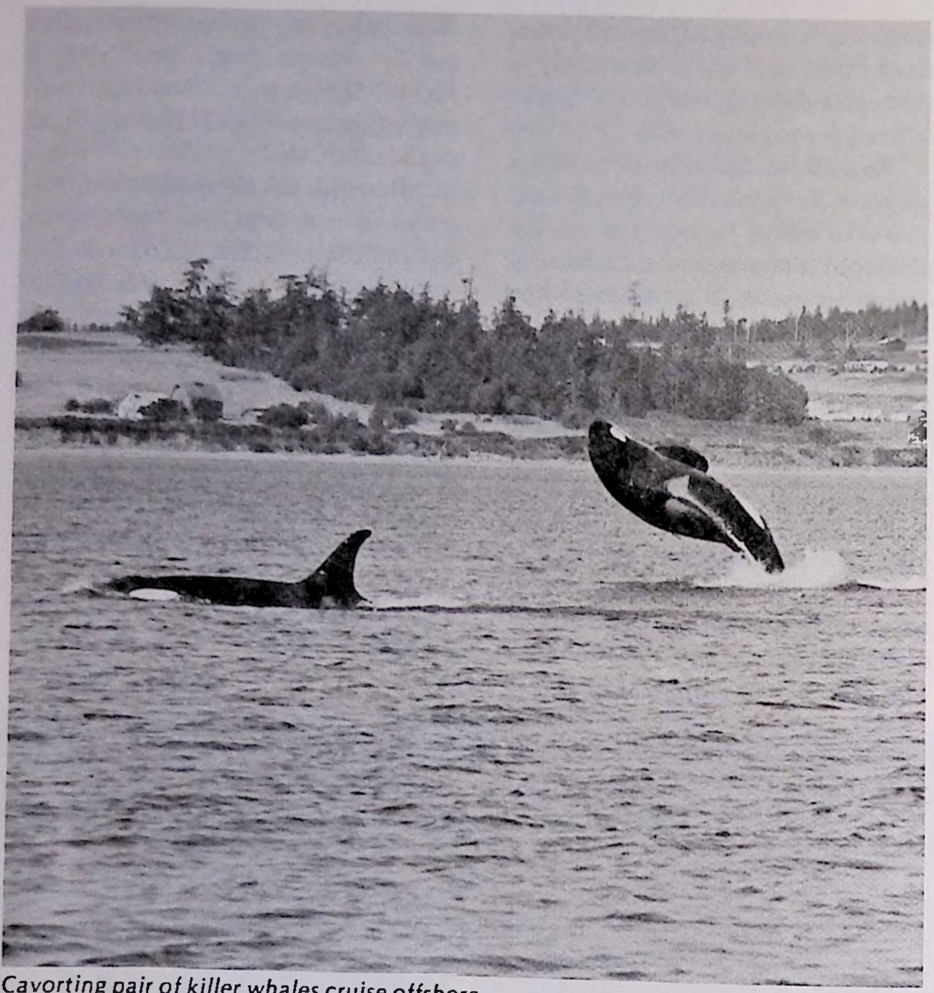
"The three-year censuses were held in late July and early August, when most people see killer whales anyway. This may help influence our own research schedule. In fact, our behavioral studies have already begun in the Johnstone Strait area, where the majority of the census sightings were made. So this will be our main study area.

"In 1972 we started an aerial census program. Someone flew out every week or two to census an area, and this has developed into a year-round scheme to determine seasonal movements. Last year—that is, 1973—we spent a month studying behavior. But this presented problems. Individual killer whales are hard to spot and identify, so we started a file of dorsal fin photographs. Each whale has its own unique dorsal fin profile, which is determined by natural nicks. By referring to the photographs and adding to them all the time, we hope to have a method of keeping track of individuals as they move around. This gives us a chance to start thinking about movement studies. We may find out, for example, that a whale spotted for the first time in Johnstone Strait might head south and show up again down in the Gulf Islands.

"We tried attaching a radio transmitter to one large bull captured by Sealand of the Pacific, which is in Victoria. It didn't work very well because killer whales have very sensitive skin that's easily damaged. Someday, hopefully soon, satellite tracking may prove to be the answer. Right now, human endurance has to be considered in tracking an animal like the killer whale, even if a transmitter could be installed and followed. Present trans-

Killer whale splashes alongside Canadian research vessel

Photo by Michael Bigg



Cavorting pair of killer whales cruise offshore

Washington State Game Dept. photo by Dick Bolding

mitters are good for about 15 miles and would have to be monitored by someone 24 hours a day. There won't be much sleep for a crew that has to keep tabs on a whale that might move 120 miles in a day. A satellite would solve this dilemma for us, but right now we're in the horse-and-buggy era as far as radiotelemetry and killer whales are concerned.

"There are some whales that can be freeze-branded routinely for identification, but in my opinion this won't work with killer whales. The principle involves placing a supercooled iron on a dark skin patch. It's left on for a few seconds to kill an area of pigment cells. Then a white patch develops that can leave a clearly identifiable mark. But in my experience this just doesn't happen on killer whales.

"We have another project under way that involves going back over old descriptions and accounts of killer whales—in other words, turning to history—in an effort to see if their behavior has changed over the past half century or more. Was there any difference in pod size in the early days? We don't know. Maybe this search of the records will turn up some answers.

"Our immediate plans consist of continuing the whale photography. We hope to expand our operations from Johnstone Strait to Campbell River and the Gulf Islands. We charter a boat for each group studying the animals. It's always a sailboat because the sound of a motor tends to scare the whales off. Under the best of circumstances it's difficult to get within 100 feet of a wild killer whale.

"I can say with confidence that one thing is known about group behavior in killer whales. Single animals—what might be termed 'lone wolves'—are very rare, if they exist at all. One may seem to be alone at a given point, but usually you'll discover that there are some others nearby, after all.

"For the past three years we have brought the public into the picture by asking them to keep watch for a day or so. Now, more detailed log books are being sent out to people. We hope to circulate about 20,000 of these by the end of the summer of 1974. This will provide a year-round sighting book. So far, we've had an excellent public response. Just up to midday today, for example, we've received 35 responses. For the year, so far, about 1000 have come in.

"The east coast of Vancouver Island will continue to be our main research area. In addition to killer whales, we continue to see the occasional humpback or minke whale. Not many, even though there are no whaling operations now off the coast of British Columbia."

Several accidental captures of killer whales (starting with the famous Namu) have taken place in British Columbia. These generally involved seine or gill-net fishermen. Canadian government regulations no longer permit unauthorized pursuit of the animals, and when they are incidentally trapped in nets, they must be released immediately.

Under the present discretionary policy, Canada's Western Regional Director of Fisheries makes all decisions in regard to capture permits. Only established institutions with skilled crews and first-rate equipment will be permitted to take killer whales. All such expeditions will be closely regulated by the Department of the Environment.

Today, the waters adjacent to the south end of Vancouver Island probably have more killer whales than any other region on earth regularly inhabited by a large human population. Furthermore, there is a relative absence of the large-scale small boat harassment that has become a problem in Puget Sound. While time is still on the side of the killer whales, the people and government of Canada seem to have come around to the realization that they are a national treasure and that no effort should be spared to ensure that they are maintained in perpetuity. *(To be continued.)*

Spiked Lamb Dulls Coyote Appetite

By Carl R. Gustavson, Ph.D.

As a professional psychologist, I am frequently asked how I ever got involved in predator control research, with an emphasis on studying coyotes. Isn't this really the province of the wildlife biologist? There is no clear-cut answer to these questions. I had always been interested in the possibilities of modifying behavior to solve specific human problems, but to an even greater degree I was fascinated by the potential involved in the investigation of animal behavior using the techniques tried and proved in ecology.

Several years ago, as a graduate student in psychology at the University of Utah, I found myself involved in a rather emotional political arena—the controversy over alleged coyote depredations on sheep. There are a lot of sheep in Utah and also a great many coyotes. The two ingredients form a perennially explosive issue. During many conversations with sheepmen and members of the Utah Department of Wildlife Resources I became familiar with traditional approaches to controlling predators: the use of poisons, traps, and aerial hunting. As these techniques had failed either to markedly reduce coyotes or to eliminate livestock losses, I concluded that research in behavior modification was the only promising alternative. But where to begin?

Along about this time I had a fateful meeting with Dr. John Garcia, an eminent behavioral psychologist at UCLA and the father of what is now known as "Garcian conditioning." I was intrigued by his description of a method of modifying behavior in animals called taste-aversion conditioning. Furthermore, he proposed that I join him in setting up an experimental program with predator control as the point of focus.

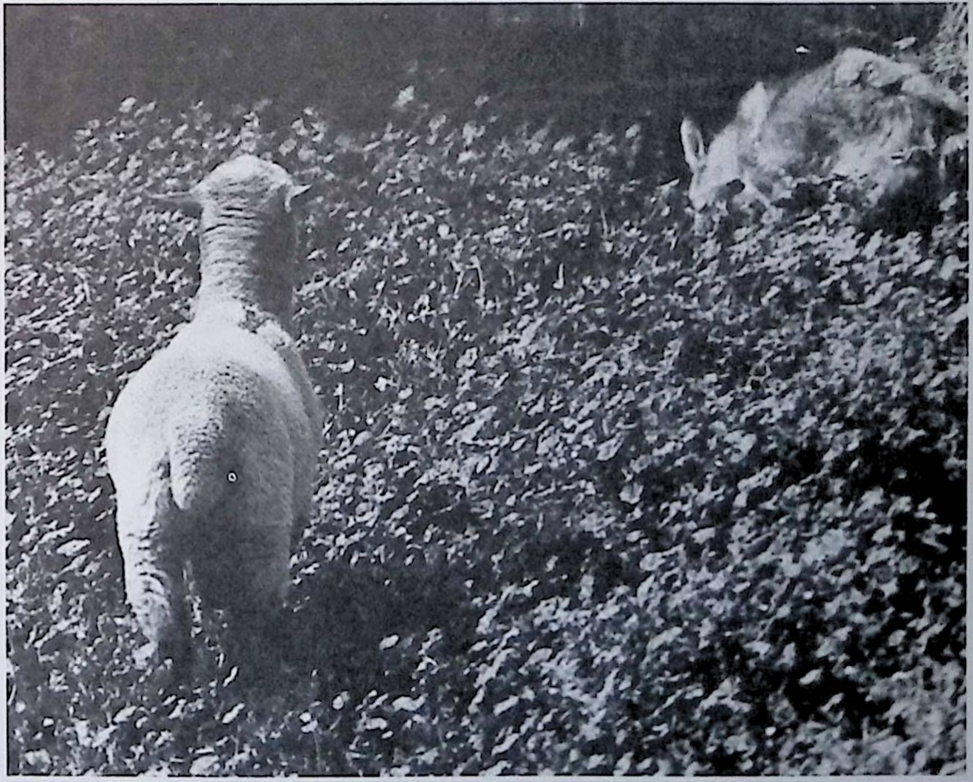
In addition to John Garcia, Walter Hankins and Ken Rusiniak, both of the Department of Psychology and Psychiatry at UCLA, joined the project. I was to be based at the University of Utah and would work most of the time with coyotes. The starting point of our research was the demonstrated fact that animals fed a distinctive flavor and then made ill with a mild poison will develop an aversion for that flavor. Thus, the pairing of a flavor and the chemical-induced illness changes the palatability of the food in the mind of the animal.

The theory behind taste-aversion conditioning is based on the following facts about predation. In the first, or hunting phase, the predator either tracks by scent, or visually stalks the prey. The second phase, attack, is triggered by the sight of the prey, and in the case of coyotes is directed at the head and neck. Finally, the killing phase brings the predator into oral contact with the flavor of the victim.

The question now arises: Will an aversion to the flesh of the prey inhibit the attack as well as the feeding phase of predation?

To try to answer this, I set up a base of operations in the area of Salt Lake City and set to work. Ecodynamics, Inc., an environmental consulting firm, rented space for me at the Redwood Game Farms, which raises a variety of animals for diverse purposes. My subjects were seven adult coyotes, approximately two to four years old, maintained in individual dog runs. Five of the coyotes were taken from their dens in the wild when about three weeks old. Three of them ("Brujo," a male, and two females, "Luna" and "Coty") had hunted jackrabbits in the desert, while two (a male, "Feisty," and female, "Dizzy") had no hunting experience. All were quite tame and readily attacked both lambs and rabbits. Two other coyotes, "Sam" and "Mary," were very shy, having been trapped as adults. As a result of being trapped, they each suffered an amputated forepaw. (They had been brought in by government trappers.) Sam eventually attacked and ate rabbits, but he never went near a lamb even when it was placed in his pen for hours. Mary never attacked any animal of either species.

Having obtained coyotes, the next step was to ensure an adequate supply of prey animals, without which there could be no research. One person who



Brujo munches grass while erstwhile prey watches

Photo by Carl R. Gustavson

eventually demonstrated a marked interest in our work was Marcellus Palmer, president of the Utah Woolgrowers. Through his efforts and those of other sheepmen, we were able to tap a ready source of lambs. Cooperation with sheep ranchers continued to improve, especially after they saw copies of a film recording our work with the coyotes.

Once they had adjusted to their circumstances, the coyotes proved in turn lovable, fun, and exciting. The only major problem involved in their maintenance was the necessary removal of large amounts of snow through the winter and early spring. The pens were located around a large grassy enclosure about 30 by 40 feet, where the animals were exercised daily.

One of our males, Brujo, got his name from a habit of staring intently at us with his baleful golden eyes for the first two weeks he was in captivity ("Brujo" means warlock or sorcerer in Mexico).

After we became well-acquainted with the animals and they became habituated to the feeding schedule, the coyotes would begin to howl whenever we approached the game farms. Dave Lewis, the owner, told me that they often knew we were on our way when we were still two miles away. In our personal relationships with the coyotes, we discovered that my wife Joan could handle the males much more easily than I could. The females were more cooperative with me, though they were more aggressive to both of us than the males. Some animal behaviorists feel that females are dominant in the coyote social system. The animals probably regarded Joan and me as part of that society.

Most of the time the coyotes would allow petting by our sons, Andy, age eight, and Eric, age three. They would even participate in play periods, with a certain amount of romping. Interestingly, the behavior of the coyotes changed drastically at dusk. Then all pretense at play stopped, and the animals displayed typical stalking action with the children serving as prey objects. No coyote followed through on his stalk, but we did not encourage socializing with the animals after sundown.

As part of our research procedure, we allowed three coyotes to kill and eat lambs. Once this feeding pattern was well-established, the coyotes were fed a bait packet of minced lamb flesh wrapped in a fresh, woolly lamb hide. The bait contained a toxic but nonlethal salt, lithium chloride, that made the coyotes violently ill for about four hours. After this, they recovered with no lasting effects. This was demonstrated when they killed and devoured rabbits.

Four days after the lithium chloride treatment, which included two days without food, live lambs were again presented. Luna loped up to her lamb, sniffed it, and circled back, hiding under a cage and vomiting within one minute. She then retreated into her pen, the lamb following. She growled and snapped at the lamb, then gagged and retched, breaking off the attack with no injury to the prey.

After being treated twice with lithium chloride bait, Coty lunged at a lamb but stopped abruptly, turned her back to the lamb, and spent the rest of the test period eating grass. Brujo, who also ate grass after being conditioned, was tested for eight weeks, during which time he never again attacked a lamb. Similar results were obtained from coyotes that were averted against the taste of rabbit. In fact, additional tests have indicated that taste-aversion conditioning is equally effective with mountain lions, and tests are currently in progress on red-tailed hawks and golden eagles.

Much still remains to be done to develop and evaluate a field usage for this technique, including perfection of an effective bait system. For suppressing sheep predation, we might scatter baits that smell like sheep, taste like sheep, and contain either lithium chloride or another nonlethal emetic toxin. A coyote would then be subjected to repeated ordeals until the flavor and spoor of sheep became aversive. Subsequently, when foraging, it would turn away before it even sighted sheep.

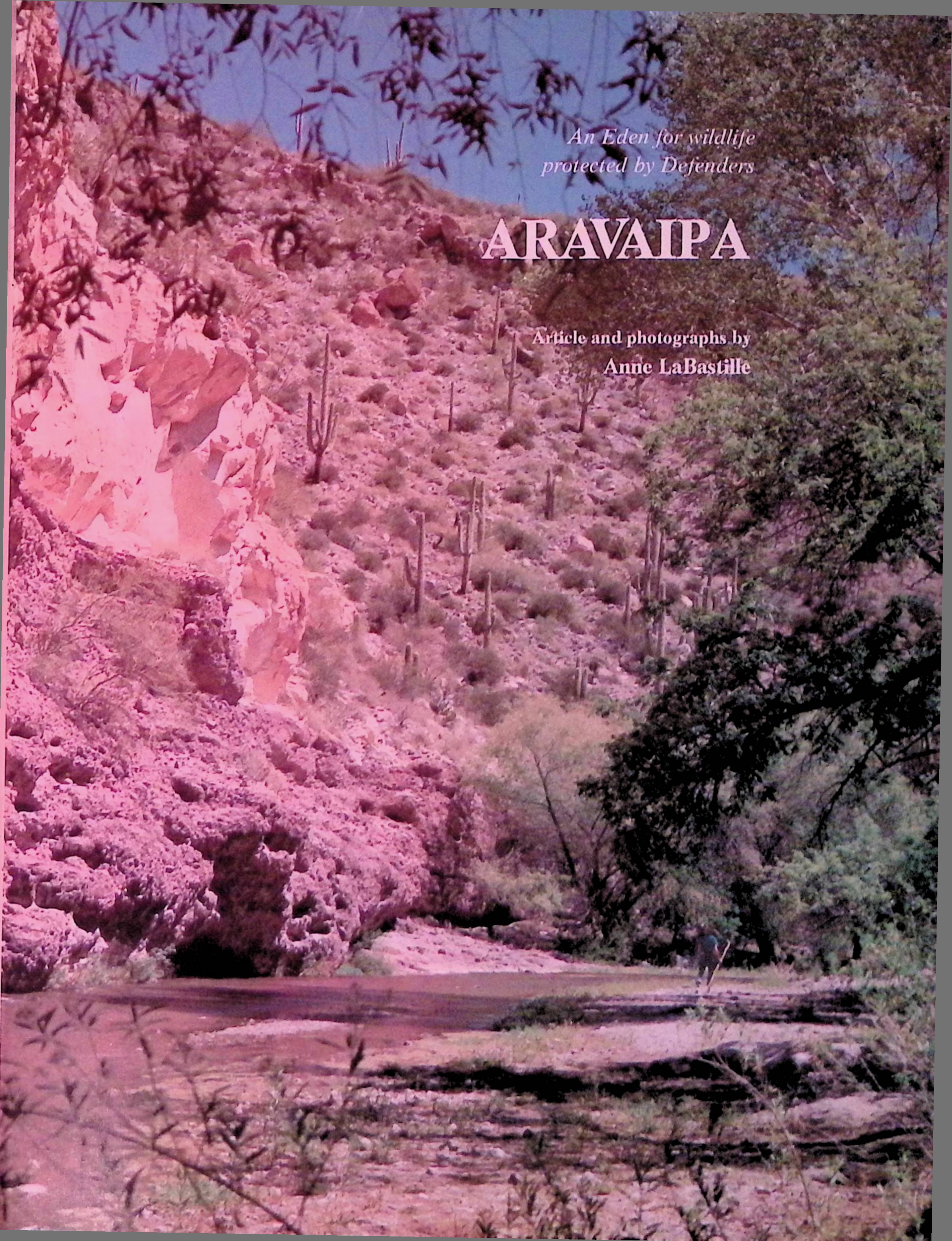
What we do have already is a technique that radically alters the diet selection of the coyote. Our data indicate that these beautiful wild dogs do not normally kill what they will not eat. The technique of taste aversion is potentially low in cost, and with refinement could lead to a more rational approach than poisoning to solving our problem of how to live compatibly with those animals that sometimes attack livestock.

I believe that the time has come for man to stop treating the other animals that inhabit this planet with a Dark Ages approach. The continuing debate between conservationists and stockmen on what to do with predators has elements of this approach. Predators are neither gods to be worshiped, nor devils to be obliterated, but rather common inhabitants of our world that occasionally engage in behavior that is unacceptable to the values of a small segment of human society.

Washington State to Fund Taste-Aversion Studies

In May 1974, the legislature of the state of Washington approved an appropriation of $50,000 to support the first year of field studies to condition wild coyotes to recoil in distaste at the sight or smell of lamb. Said Dr. Carl Gustavson, who worked with captive coyotes to develop taste-aversion techniques at the University of Utah: "Taste-aversion conditioning represents a radical departure from traditional methods of predator control, which were based on suppressing coyote numbers by killing them. We may now have a tool that works more effectively, not by killing coyotes, but by manipulating their behavior. This approach means that both predator and prey—in the case of livestock—can be spared."

Governor Dan Evans of Washington signed the appropriation measure into law, with the provision that Dr. Gustavson work closely with state agencies involved, particularly the Department of Game. Dr. Gustavson will be based at Eastern Washington State College in Cheney, but will conduct his field work in a number of areas where woolgrowers claim that coyote predation is a problem.



An Eden for wildlife protected by Defenders

ARAVAIPA

Article and photographs by

Anne LaBastille

It was snowing gently when I first rode up Aravaipa Canyon in April. But this was Arizona snow—the white fluff of cottonwood seeds drifting across the canyon entrance and sailing down Aravaipa Creek. My horse pranced into the water, throwing a silvery spray in all directions. The canyon was narrowing, boxing up, heightening.

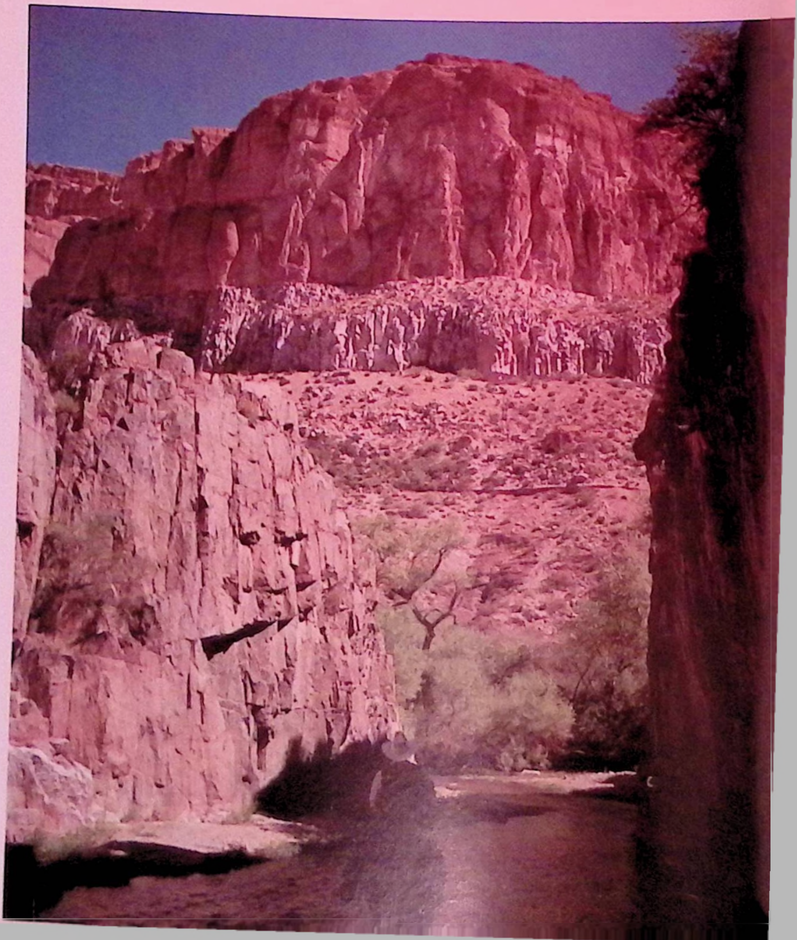
We had started from the George Whittell Wildlife Preserve entrance at the west end of Aravaipa an hour ago. Our goal was to ride along the 15 miles of creek right through the canyon, exploring, photographing, looking for wildlife. We would pass over Defenders of Wildlife lands, enter the Bureau of Land Management primitive area in the heart of the canyon, and emerge two or three days later on Defenders holdings at the east end. This was my first experience in Sonoran desert country and canyon land, so I tingled with anticipation. Being an imaginative Easterner, however, I secretly suspected that the desert might be a menacing place of rattlesnakes, scorpions, spines, thorns, centipedes, flash floods, bucking horses, thirst, and heat stroke.

Defenders Preserve ranger, Larry R. Coak, a muscular former deputy sheriff, lent a reassuring presence to our group. Larry's advice was simple, "Walk slow and look sharp. You won't have any trouble and you'll discover what a fascinating place the desert really is." So I slowed down to half speed and took the first step towards becoming a confirmed "desert rat."

Aravaipa is often called "the miniature Grand Canyon" of Arizona. It was easy to see why. Perpendicular, multicolored, convoluted cliffs stretched above us 500, 700, 1,000 feet, perhaps higher. "Chocolate cake with vanilla icing," grinned Neil Wood, our young wrangler, pointing towards a striking formation of brown and white layered rock. Letting our imaginations play on the overhanging rimrock, we saw giant gargoyles, elephants, knights in armor, porpoises, Indians, even a Virgin Mary silhouetted in stone against the cobalt blue sky. The shattering, blasting, smoothing, crumbling effects of heat, cold, sun, wind, water, and gravity are actually in action here. Unlike the Grand Canyon, which numbs the mind with its geological grandeur and timelessness, Aravaipa is close, tangible, and possible.

As the canyon closed around us, the horses zig-zagged through the creek. We were in wall-to-wall water. Beneath me, I saw the sudden swirl of small fishes. Easing up on a still pool edged with watercress, I watched a small school of the rare and endangered spikedace (*Meda fulgida*) fin themselves over the smooth pebbles. Another endangered species, the loach minnow (*Tiaroga cobitis*), lives in Aravaipa Creek. Five more fishes occur in this short stretch of stream. Surprisingly, the Aravaipa surfaces from underground close to the eastern end of the canyon, then disappears a few miles below the western end. This brief 15 miles of water is perennial and unpolluted. Old-timers cannot remember when Aravaipa Creek has ever dried up.

No other creek in Arizona is known to support such a large number of native fishes. The fishery in Aravaipa is not immediately threatened because of its dependability of water and isolation; however, the survival of fishes in the San Pedro and Gila River systems is generally precarious. This is due to



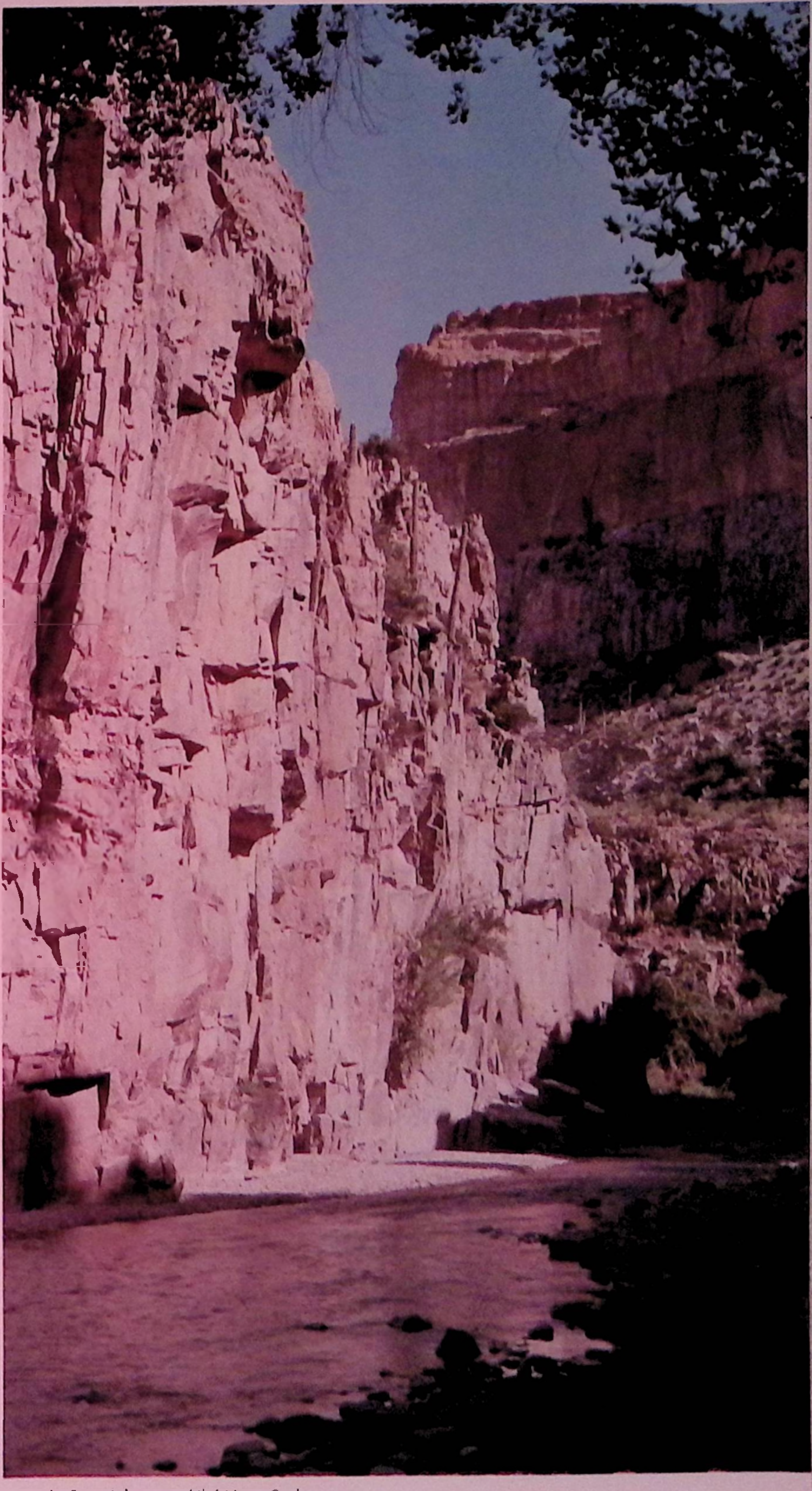
Layered ramparts dwarf a rider along Aravaipa Creek. In spring, cottonwoods on its banks strew the air with seeds from snowy bolls.

changes taking place all over the southwest—falling ground water tables, water pollution from mining and housing, the diversion of streams for irrigation or livestock, and the introduction of exotics. The native Arizona fish fauna totals 28 species, while foreign fishes already number an overwhelming 37 species. Thus, Aravaipa Creek is a small sanctuary of a rapidly disappearing habitat for these unusual and original forms of wildlife.

Having had the pleasure of fish-watching, I turned towards the trees that edged the water. Spring migration was under way and birds were everywhere. A brilliant Audubon's warbler flitted along a willow branch. Two canyon wrens trilled from a weather-beaten log. An uncommon Mexican visitor, the zone-tailed hawk, flapped heavily off its roost. Another unusual bird reminiscent of higher mountains, the water ouzel, dipped and dived in midstream. Three bright pyrrhuloxias flashed up a hidden side canyon.

Neil tied our horses and motioned

Desert shrubs and even a few hardy saguaros cling to toeholds in a craggy wall. To this rugged realm, author Anne LaBastille brought a photographer's vision, a writer's perception, an ecologist's understanding—and an Easterner's wonder at the wilds of the West.



Photos by Steve Johnson and (left) Larry Cook

Water is a patient sculptor, working rock through eons as species rise and vanish. In flood it carries grit that grinds hard stone away. In trickles it enters cracks, then freezes to pry boulders loose. In Aravaipa the artist is still at work.

for us to follow. We began a day of exploring side canyons of the Aravaipa. A shiver ran across my shoulders as we stepped from the baking sun of the main canyon into that shadowy cleft. Greenish-black pools lay below huge boulders. We worked our way up the gorge until a gigantic rock blocked passage. One delicate clump of maidenhair fern grew from a cool crevice on its side, the only living plant in that sunless ravine.

Each side canyon we passed—Javelina, Virgus, Horse Camp, Parson's Booger—opened up a new and different environment. One seemed surrealistic, another intimate, yet another awesome. In Javelina Canyon I splashed under a foamy waterfall that tumbled over a mossy bank. Up Horse Camp Canyon we discovered a series of strangely pitted stones, hollowed-out bowls, and gracefully carved caves. I half-imagined a Buddhist monk meditating in one of those cool retreats. In Booger Canyon one clump of yellow columbine brightened the stark gray boulders above a musical spring.

Everywhere we tramped we found water—water that had cut and carved Aravaipa's gorges so deeply and exquisitely. As my body baked, perspired, and dehydrated, I came to appreciate why water is the "liquid gold" of the desert. In Aravaipa a thirsty traveler has only to lie down on the creek bank and drink from the stream. This is a blessing for an area that receives only 15 inches of rain per year.

Late afternoon heat was replaced by cooler evening air. Cottonwoods and sycamores rustled. Shadows deepened. Far above us the canyon walls turned several shades of red. Sparrows and solitaires sang their vespers. Time to find a campsite.

Larry pointed out a wide-mouthed, shallow cave, dry as bone and several feet above creek level. A campfire was soon illuminating the cave. Our horses munched nearby on succulent grasses. Even in the unlikely event of rain, we would not have to worry about flash floods here. Nevertheless, evidence of their fury lay about us. Torn tree trunks and branches were lodged ten to twenty feet above our heads against

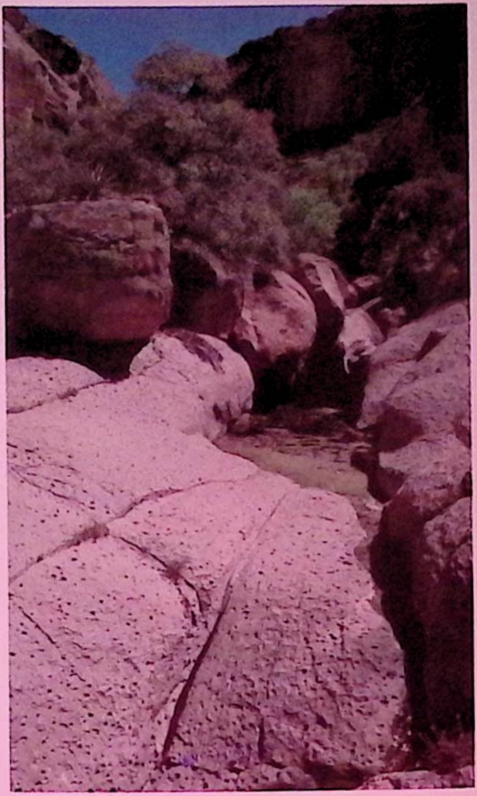
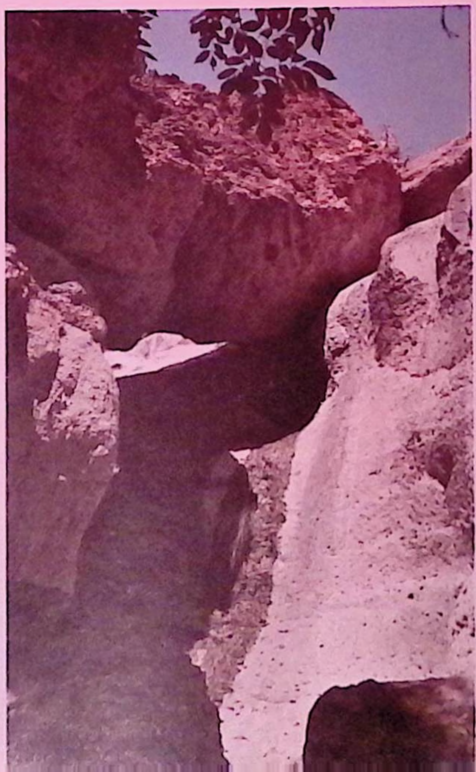


Photo by Steve Johnson

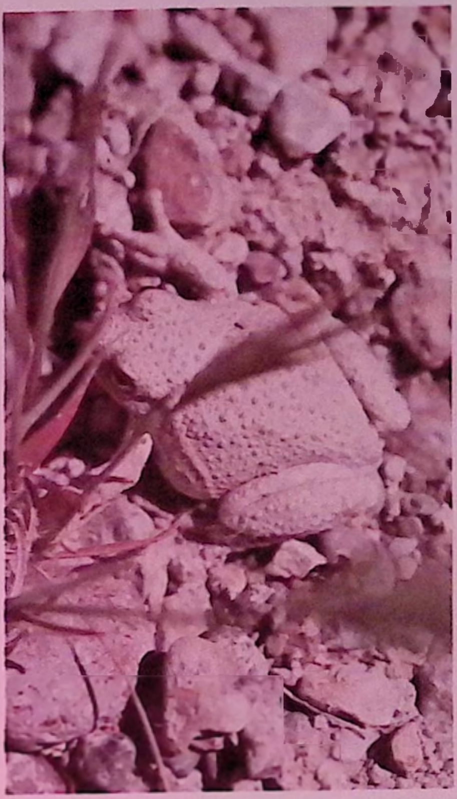


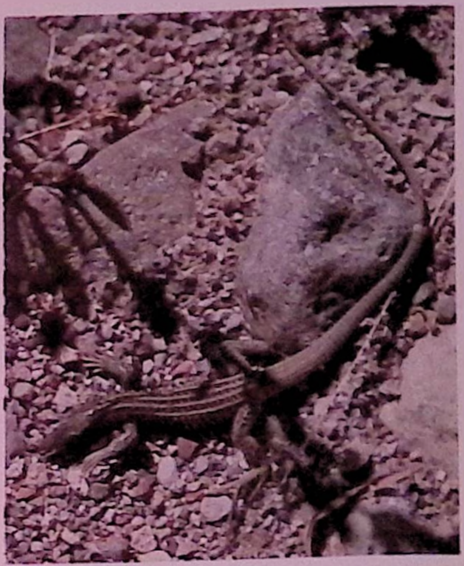
the canyon walls. Obviously anyone entering Aravaipa's inner gorge in the summer rainy season would be advised to use extreme caution. Often thunderstorms occur miles away and are totally unsuspected down in the canyon. Yet a wall of water may move for miles downstream sweeping away any creature in its path.

Our alarm clock next dawn was a frisky ground squirrel whistling a welcome. Coffee smelled wonderful in the chill clean air. We quickly saddled up; we had to keep moving to stay warm, as it would be hours before the sun reached the canyon bottom. As we neared the east end, cliffs receded. The landscape was gentler, greener. We stopped near Paisano Canyon, named for Paisano Salazar, one of the first Mexican settlers. His son, Lupe, 80 years old, still lives in Aravaipa. We saw the remains of his original homestead, a one-room cabin ringed with green pastures and splendid buttes. Lupe and his wife raised seven children, grew crops, and grazed cattle in this isolated piece of canyon. Lupe, as solid and brown as an oak tree, told me later, "I rose between three and four in the morning, did the chores, rode an hour out the canyon to a ranch where I punched cows all day, rode back, did the chores, and fell into bed around midnight. Did this for twelve years. It was a hard life, but, you know, I really love this canyon. It's a good place to live."

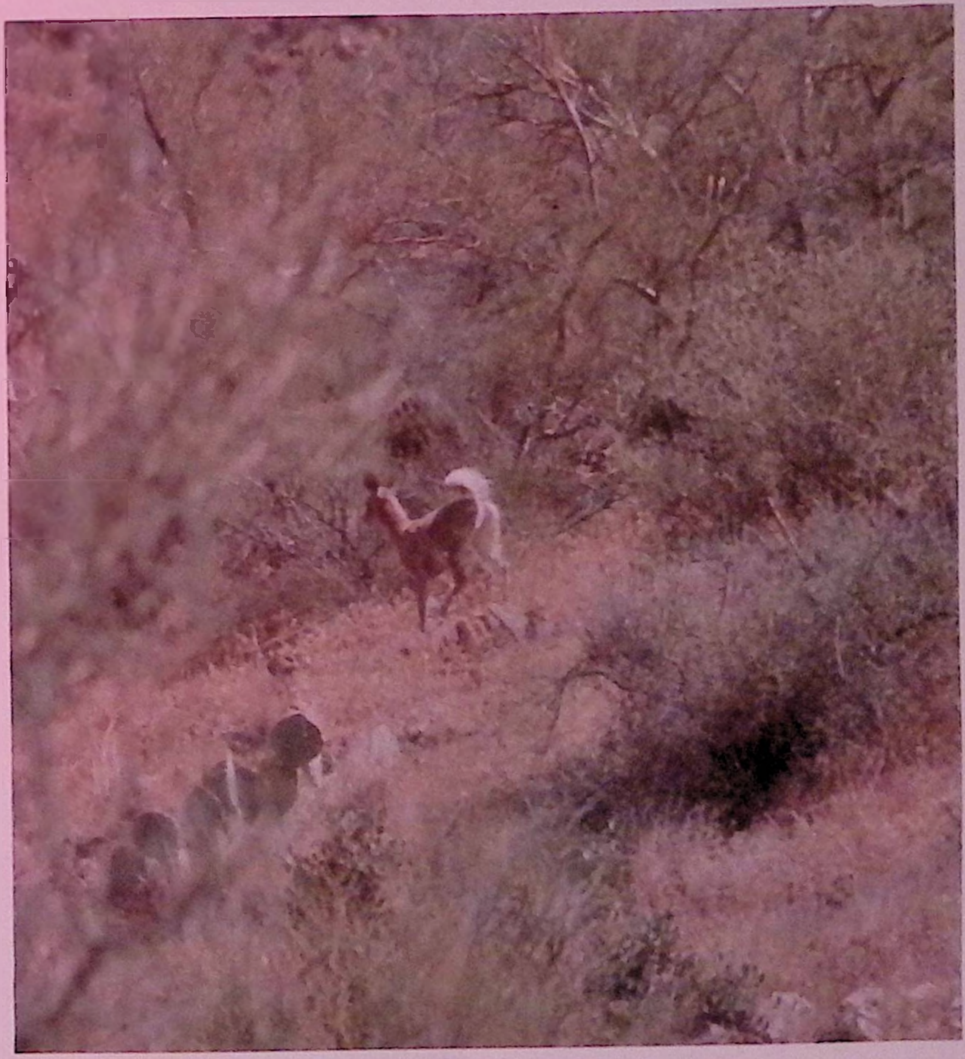
Tex, his handsome son who now manages the Salazar holdings further upstream, confirmed that it *was* a good life. "We might have been poor," he mused, "but we were happy." Tex threw one arm affectionately around Lupe, another over his young son's shoulder. They sat there—three generations raised in Aravaipa—seeing the canyon change from pioneer settlements to working ranches to a wildlife sanctuary and wilderness area.

After resting up at the comfortable Defenders ranch near Klondyke, we made a foray for fresh supplies from the





Whiptail and canyon tree frog all but disappear among pebbles worn from the canyon's rocks. With few plants to hide among, their best defense is to blend in.



Danger flag flying, a white-tail lopes for cover. Scent glands on the deer's hooves leave a warning.

general store. "We don't have much of anything, but we have a bit of everything here," smiled Rita Ramirez, the attractive storekeeper and postmistress. Her "bit of everything" included some tasty tamales just out of the kitchen.

We struck off by four-wheel-drive vehicle to make a large loop across the isolated tablelands and rimrock back to Aravaipa's western end. We drove up Turkey Creek, a major seasonal tributary of the canyon. Huge willows, cottonwoods, ashes, sycamores and walnuts thrive in the wash. It would take three men to circle some of these trunks. Along the way, we stopped at Indian House, an adobe-and-wood structure preserved within a shallow cave. The original rafters, still intact, date from Pueblo Indian dwellers in the 14th century. These Indians were agriculturists, growing corn, beans, squash, and hunting game on the Aravaipa plateau.

Straining on hairpin turns and rocky washes, our Jeep wound up almost impassable tracks to the southern rim of Aravaipa, where we would spend more time seeking wildlife and exploring. Suddenly, two white-tailed deer flashed out of a gully. A short while later, four mule deer sprang into view. Big ears twitching, they let us have a look before leaping into the mesquite bushes. In contrast to the canyon bottom and its numerous small, nongame species, these tablelands and rimrock were rich in large game animals. The tracks, droppings and rootings of javelinas were abundant, but the wily creatures must have scented us and hid. We found a cave littered with scat from a mountain lion.

Up on the rimrock with its southern exposure, I had my introduction to cacti. One must marvel at the evolutionary adaptations these plants have made for desert survival. They have abandoned leaves because the transpiration loss of water is too costly; instead, they spread out a vast root system and swell up and store water after rains. The saguaro cactus is surely the "camel of the desert." Weighing up to 15 tons, a mature plant may absorb an extra ton of water during a storm. Turgid and fat, the saguaro resists

drought for months. Those we saw, however, were thin and heavily ribbed. Arizona had experienced its greatest drought in 72 years.

Prickly pears, barrel, hedge hog, cholla cacti also were abundant and just beginning to flower. So, too, were the countless delicate desert ephemerals that put surprising splashes of color upon the stark, stony soil. The variety was lovely—blue lupines, orange mariposa, violet filaree, crimson penstemon, white daisies, lavender mallow, yellow evening primrose, pink fairy duster, and silver puffs.

Under the hulk of Table Mountain, we stopped at Table Mountain mine, a once thriving silver mine in the late 1800's. In those days 400 to 500 people lived here. Today it is abandoned, its great smelters rusting, its stone work crumbling. A lone black rattlesnake whirred its warning near the old shaft entrance. We went no farther.

Nearby I met Claude McNair on horseback. He is one of the ranchers who has collaborated with Defenders of Wildlife on the sale of his property for the Preserve. Smiling his slow, easy grin, Claude dismounted to chat. I had time to appreciate the soft, quiet voice

Full of moisture, saguaros endure rainless weeks on the slopes as trees drink deeply at river edge and ocotillos dot the vale with blooms.

Silver puff opens a tiny bouquet

Yellow columbine forms a star

Desert mariposa may rise two feet

Hedgehog cactus hugs the ground

of the true Arizona cattleman, guaranteed not to disturb his livestock. Claude lamented the litter that occasional backpackers and campers leave in the canyon. Since the dry climate retards oxidation and general organic deterioration, refuse builds up and could become a major problem on the Preserve.

Putting the Jeep "in grandma" (low-low gear), we jounced onwards, downwards, the upwards towards the Defenders outpost line shack. By late the next afternoon, we were close to 6,145-foot Holy Joe Peak. To my amazement, sturdy green oaks and blossoming apple trees surrounded the small rustic cabin. A spring of icy water gushed out of the slope and meandered into Oak Springs Canyon. I learned that a western line shack provides all the necessary comforts for its weary occupants, be they cowpunchers or photographers. It boasted a wood stove, kerosene lamps, bunk beds, and pure water. Late that night, a lone coyote and a whippoorwill took turns serenading us across the hills.

We spent the next day tracking wildlife down in Oak Springs Canyon and up on the tablerock. Javelinas, black-tailed jackrabbits, and bobcats had all left their sign. Unfortunately, the small herd of bighorn sheep are found only on the north side of Aravaipa Canyon, so we couldn't search for them. Every time we walked up a wash, we switched to rock hunting. Carefully scanning the ground, I found samples of fire and rose quartz, geodes, and chunks of rock veined with turquoise. By noon, my pack was ponderous with their weight.

Hoping for a spectacular sunset, we headed for the edge of the canyon in late afternoon. Signs of early settlers lay here and there. Most interesting was the Stone House. A lone rancher, "Cattle King Smith," once lived here. His house had gun holes and curiously low windows from which he could protect himself against marauding Indians. It was during this era that the Apaches moved down into the Aravaipa region. We saw the sump where the Apache Kid camped with his kidnapped squaw of

Poppy-like bloom is really a lily

Desert marigold lures a visitor

Penstemon resembles its garden kin

the moment. When he realized that the U.S. Cavalry was hot in pursuit, the Kid whipped the girl off on horseback, then escaped in the opposite direction. The Indian squaw was mistakenly shot to death by the soldiers while the Apache Kid lived on to recruit still other maidens over the next few years.

Sunset found us on the rim, peering down at the quicksilver creek a thousand feet below. The wind had stopped and silence settled over the canyon land save for the companionable chittering of white-throated swifts. The sun lowered over distant gray and mauve mountains. Nearby junipers were washed with gold. A few hopeful vultures still soared on updrafts from the canyon. Abruptly at 6:55 p.m. the sun set. At 7:05 p.m. an unearthly hush fell upon our earth. Even the vultures were grounded and two raspberry-colored jet streams seemed frozen in space. This was a silence different from any I'd ever known. Time trembled in a trance until the buzz of a vagrant mosquito broke the spell.

Next day we completed our circle, arriving at the Wood Ranch in time for a hearty dinner. Over coffee, I learned that Cliff and Fred Wood were the first inhabitants to recognize that the value and beauty of Aravaipa must be preserved. "Our mother and father taught us to love animals and conserve the land," related Cliff Wood, a wiry, weathered rancher. Both he and Fred, his older brother, obviously spilled a lot of their love on the land. Grass flourishes. Fruit trees blossom. Windmills pump water into stock ponds high up on the plateau. These make fine water holes for both cattle and wildlife. As Alice Wood, Fred's charming wife, says, "Every day I look around and know it's the most beautiful place in the world."

Fred and Cliff contacted The Nature Conservancy in hopes that this national conservation organization might be able to purchase their land to form a wildlife sanctuary. After making a down payment on their ranch, The Nature Conservancy was not able to raise the necessary funds to complete the transaction. Thus Defenders of Wildlife became involved in the campaign to save Aravaipa Canyon. Several Defenders officials were associated with The Conservancy, so the transfer was a natural one. By great luck, the generous bequest of George Whittell in 1969 allowed Defenders to purchase the Wood Ranch and several others, amounting to over 100,000 acres of land owned and leased in and above Aravaipa Canyon.

Early Indians ate the prickly pear

Locals call this "rainbow" cactus

Cholla is tough, hardy, well armed

Ted Steele, one of the most dedicated conservationists in Arizona and a Defenders board member, did much to champion the Whittell Wildlife Preserve idea. When it became apparent that the Federal Government did not have enough property to put together to save the stream, other than the inner canyon primitive area, Defenders plan became even more essential. The ultimate goal, of course, is to acquire sufficient property around Aravaipa in order to protect this unique pocket of fish and wildlife, and to prevent ecological damage to the creek and canyon lands.

The 5,657-acre Primitive Area, managed by the Bureau of Land Management, protects the heart of Aravaipa Canyon. This classification prohibits the entry of motorized vehicles and guards the wilderness character of the area. Such designation is basically in keeping with Defenders objectives on the Preserve. The only point of disagreement at present is over the access of hunters to distant but adjacent federal lands.

With Defenders now owning both entrances to the canyon, it is asking any person who wishes to hike on the Preserve to obtain a permit from the Defenders Tucson office and to sign the registers at either gate. This is not intended to keep the public off Defenders land or out of the BLM Primitive Area, but to protect the canyon's fragile ecosystem. It also allows people to be contacted or rescued in case of emergency. Louis Barassi, president of Defenders, says succinctly, "Aravaipa is a unique place. Entry to the canyon must be rationed just like any rare commodity." Checking with Harold Watling, supervisor of the Defenders Tucson office, I learned that a maximum of 50 permits a day are issued.

Sunlight drops in briefly at a side canyon where shadows rule the day.

Many permits go to educational groups, schoolchildren, and college students. I recalled an enthusiastic group from the Marin County Day School in California taking an eight-day ecology course in Aravaipa Canyon. One morning at the east end, we watched the Pima County senior class cavort in the creek during a field visit. And every weekend, bronzed University of Arizona or Arizona State University students backpack through the canyon. Surely each one goes home with a greater appreciation and concern for the natural wonder and peace of this area.

Some people have objected vehemently to the sensible exercise of private property rights and bold conservation methods employed by Defenders. A series of inflammatory newspaper articles has condemned the organization as being "subverted into a land-owning, cattle-raising, power-conscious group able to throw millions of dollars into an unsophisticated ranching area," or that "conservation is being taken over by conglomerates just like industry and agriculture."

As Mr. Barassi realistically points out, "The problem is that Defenders of Wildlife is bringing something new into the area. A lot of people don't understand it so they overreact."

The "something new" includes two innovative steps taken to protect resident wildlife, including all predators, on land Defenders does not own or cannot control. One is an agreement with the San Carlos Apache Indians on The Mineral Strip (a 232,000-acre area just north of Aravaipa) to pay $15,000 a year in lieu of allowing white men to hunt on the reservation. This money compensates the Indians for permit fees they might have earned and puts The Mineral Strip almost in the category of a wildlife sanctuary. Secondly, Defenders pays Aravaipa ranchers whose lands are not within the preserve a set amount (usually $250) for every calf or sheep killed by wolves, mountain lions, bears, or coyotes, with the firm understanding that these predators go unharmed. (On actual preserve lands, firearms are prohibited.)

One of the most interesting aspects of the entire undertaking is that Defenders is running a conservative number of cattle on their lands leased from the Federal Government. It's not that the organization hopes to go into the beef business, but by law it must have livestock in order to hold the grazing leases on public lands. And a great portion of the Preserve is leased land. More important is the strong conviction that livestock, fish, wildlife, including predators, can coexist and maintain a healthy balance with the land. Defenders employs a range ecologist to conduct research programs that may yield hard data on the interrelationships between wildlife and livestock. This type of research, conducted carefully on such a large and diverse tract of land, could give results that might dramatically change prejudices against predators. Dr. Richard H. Pough, former Defenders president, said, "We want to demonstrate to the ranchers in the state that if wildlife is carried to the capacity of the land, predators will feed on wildlife and not bother cattle."

Meanwhile, Aravaipa's creek, canyon, and rimrock wait passively under this new storm of human controversy just as they have waited through eons of natural storms. Nature has made desert plants, animals, soils, streams, and rocks incredibly hardy. All struggle to survive, but I doubt that they can endure the modern-day conservation crises without, ironically, assistance from humans and their conservation groups.

Land development for industrial and trailer parks, vacation homes and subdivisions upstream could turn Aravaipa's water to murky sewage and destroy the pristine scenery. The steadily dropping water table in Arizona caused by overtapping this unreplenishable resource may someday be reflected in a reduced flow along the Aravaipa. Cacti are being dug up and sold as curios at an extraordinary rate. More and more wildlife species are being wiped out. Today, when the wind is wrong, smoke from the giant copper smelting plant at San Manuel shows up at Aravaipa's west end 25 miles away.

Photo by Larry Coak

The author palms a drink from a pool in Booger Canyon. Rare fish species find sanctuary in Aravaipa Creek, where the lifeblood of the canyon flows clean and clear.

And litter, as Claude pointed out, is an ever-present problem.

As Edward Abbey, Aravaipa resident, wrote in his book, *Desert Solitaire*, "We need wilderness whether or not we ever set foot in it. We need a refuge even though we may never need to go there. We need the possibility of escape as surely as we need hope...." Aravaipa fulfills that need.

HOW TO GET THERE

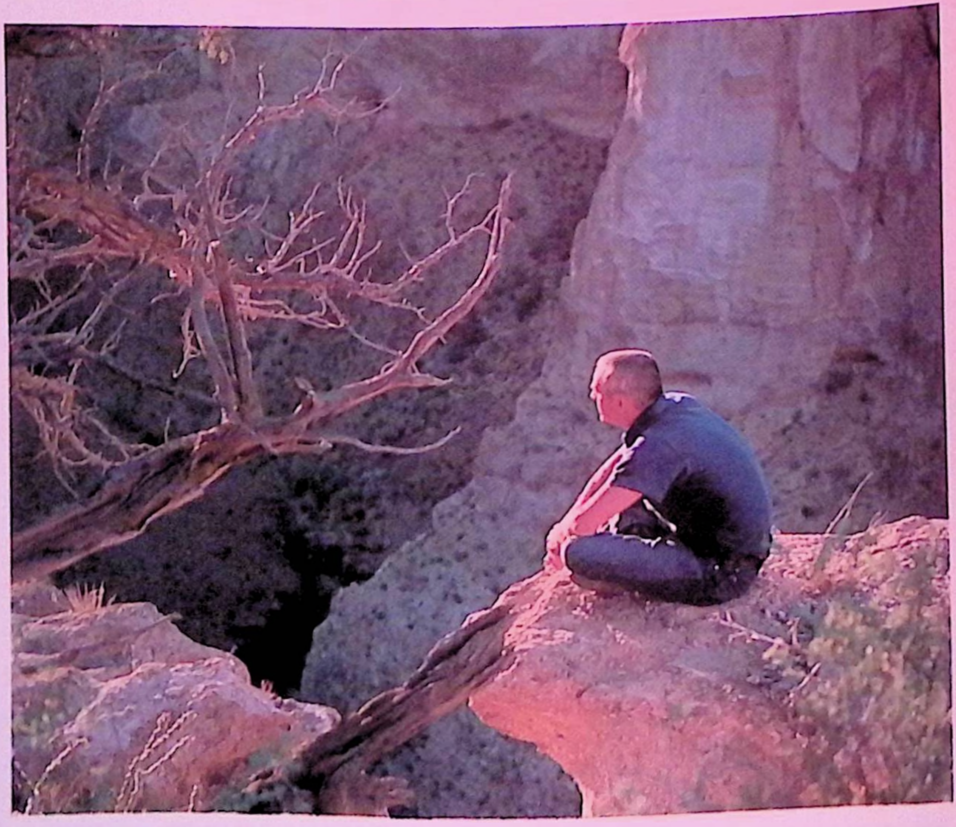
From Tucson, there are two routes to Aravaipa Canyon. To reach the west end, take U.S. Highway 89 north to State Route 77 at Oracle Junction; travel State Route 77 to ten miles north of Mammoth; turn right (east) on the county dirt road marked "Aravaipa Road," and drive 11 miles to the Defenders entrance at Wood Ranch.

To reach the east end, take Interstate Highway 10 about six miles east of Wilcox; take State Route 666 north about 15 miles to route 266. Turn left (west) on 266 to Ft. Grant and Bonita. Continue north on country dirt road 28 miles to Klondyke. Aravaipa Canyon is eight miles beyond Klondyke.

From Phoenix. To reach west end, take U.S. Highway 60 to Globe, then State Route 70 to route 77; travel south to ten miles south of Winkleman. Then turn east on Aravaipa Road to Wood Ranch. Or, to east end, U.S. 60 to Globe, State Route 70 to within ten miles of Safford, then the dirt county road west 40 miles to Klondyke.

The Aravaipa area is sparsely settled. The nearest towns in which to obtain supplies are Pima, Thatcher, and Safford on the east; Hayden, Winkleman, and Mammoth on the west.

Defenders Tucson office address is: c/o United Bank Building, 3rd Floor, 120 West Broadway, Tucson, Arizona 85701 (for permits).



Century plants on a butte near Oak Springs stand night watch as the sun sets. Preserve ranger Larry Coak catches its golden glow from the rimrock of Aravaipa Canyon.

BATTLE FOR THE WHALES

By Christine Stevens

Until it was almost too late, a diffuse and mild concern characterized the thoughts of conservationists and humanitarians about those remote giants, the whales. Only a dogged few tried hard, in the days when saving the whales would have been most effective, to reform the extreme cruelty of the method (the explosive harpoon) and to curb the rapacity of the whaling industry.

Now mildness has turned to wrath, modest proposals have changed to street demonstrations and an international boycott of Japanese and Soviet goods, and bills have been introduced in Congress to provide for embargo by the United States Government of *all* products from nations that "diminish the effectiveness" of any international agreement for conserving marine resources.

Dr. Harry Lillie, a pioneer in the protection of marine mammals, worked with Major Charles Hume of the Universities Federation for Animal Welfare in Britain to develop an instant-stunning instrument to spare the whales the torment he observed at firsthand when he sailed as ship's surgeon on a commercial whaling expedition. His description of the death of a whale shocked delegates to the 1958 Law of the Sea Conference but failed to produce tangible help. "The present-day hunting harpoon," Lillie wrote, "is a horrible 150-pound weapon carrying an explosive head which bursts generally in the whale's intestines, and the sight of one of these creatures pouring blood and gasping along on the surface, towing a 400-ton catching vessel by a heavy harpoon rope, is pitiful. So often, an hour or more of torture is inflicted before the agony ends in death. I have experienced a case of five hours and nine harpoons needed to kill one mother blue whale.

"If we could imagine a horse having two or three explosive spears driven into it, and then made to drag a heavy butcher's truck while blood poured over the roadway until the animal collapsed an hour or more later, we should have some idea of what a whale goes through."

It was not the cruelty, however, but the greed of the whaling industry that brought it up against the first truly effective action ever taken in defense of whales: Secretary of the Interior Walter Hickel's placement of all eight great whales on the U.S. Endangered Species list in 1970. Pointing out the decimation of the biggest of the whales, Secretary Hickel noted that the whalers are now concentrating on smaller whales. "As they go down the line," he wrote in *Sports Illustrated*, December 14, 1970, "they must kill more whales, and even porpoises, to make the business barely pay. In 1930-31 some 43,000 whales yielded 3.5 million barrels of oil. In 1966-67, 52,000 whales yielded a mere 1.5 million barrels."

Referring to his listing of the blue whale, gray whale, fin whale, sei whale, sperm whale, bowhead whale, humpback whale, and right whale on the Endangered Species List, Hickel said, "The second reason I took this action was that all whale products, with the exception of the meat, can be produced by other means. After we killed off the buffalo we found replacements for its meat and hide. Must we kill off the great whales before we use the replacements for its products? Soap, margarine, beauty cream, machine oil and pet food are hardly a justifiable reason to destroy

Defenders Director Christine Stevens, President of the Animal Welfare Institute, signs up another boycotter.

Photo by Deborah Duff

the world's mightiest creature. Substitutes can be used for all of these products...."

There are no substitutes for whales. Each individual species provides extraordinary interest once the time is taken to observe it *alive.* The general public first became aware of the wonders of the humpback whales' songs when Dr. Roger Payne's underwater recordings, done for scientific study, were issued by Capitol Records and promptly sold 100,000 copies. These songs have been played so often on radio and television that they are generally known either on their own or in conjunction with the Hovaness symphonic poem which features the voice of the whale. Dr. Payne's long study of the Southern Right Whale, 1973-74, has brought back fascinating observations on the joyfulness of this nearly extinct species which is prone to spend an eight-hour day at imaginative play.

It was Dr. Payne who, in the paper which accompanied the first recordings of "The Songs of the Humpback Whale," proposed a ten-year moratorium on the commercial killing of whales.

This proposal, presented in the form of resolutions in the U.S. Senate and House of Representatives in 1971 was unanimously adopted, and it formed the basis of the resolution proposed by the U.S. delegation to the Stockholm Conference on the Human Environment in 1972. The beginning of the Conference was far from encouraging. The U.S. delegation suffered defeat on everything it brought up, so it was with some trepidation that the resolution for a ten-year moratorium on all commercial whaling was put forward to the 112-nation environment conference. But to the delighted surprise of our delegates, it was approved by 53-0! Three whaling nations, Japan, Brazil, and South Africa, abstained, but none voted against it. Russell Train, then Chairman of the Council on Environmental Quality, had reason to approach the meeting of the International Whaling Commission in London only a few days later in an optimistic mood, but despite vigorous advocacy of the moratorium, the vote went against the United States' proposal 4-6 with 4 abstentions. The "whalers' club," as the International Whaling Commission has often been called, was having none of it. Nor did they want publicity focused on their manner of parceling out the whale quotas.

Tom Garrett, Wildlife Conservation Director of Friends of the Earth, who attended the meeting as an advisor to the U.S. delegation, wrote, "The first act of the Commission in its opening plenary session, after the delegates had run the gauntlet of Friends of the Earth (FOE) pickets, led by Angela King of FOE Ltd.'s London office, was to eject the press. A U.S. resolution to re-admit newsmen failed to receive a second. Dr. J. M. McHugh of the U.S., the Chairman of the IWC, then dutifully warned delegates and observers not to divulge the proceedings to the press or public."

Later in the week, however, Russell Train simply called a news conference and disclosed the votes of the commissioners on the U.S. proposal for a moratorium, causing considerable embarrassment to those who had relied on the IWC's traditional secrecy to vote counter to the positions their countries had taken at Stockholm. At the end of the meeting Dr. McHugh resigned as U.S. Commissioner, and soon after, Dr. Robert M. White, Administrator of the National Oceanic and Atmospheric Administration, took over as Commissioner and head of the U.S. delegation.

Before the 1973 meeting of the IWC, much work had been done by conservation and humane groups and the government, and when Dr. White proposed the moratorium, it won a simple majority: 8-5 with one abstention. Strongly opposed by Japan's head of delegation, Mr. I. Fujita, who doubles as Chairman of the Japanese Whaling Association, Dr. White bolstered his argument for a ten-year moratorium with questions that the whaling industry has refused to face. For example, "Can the social structure of these animals sustain catches based on maximum sustainable yield? Are we justified in using the maximum sustainable yield concept which has evolved from studies of fish?"

Fish lay thousands of eggs that hatch in short periods, but an infant whale matures slowly, accompanying its mother for two years before it is even weaned. Young cetacea, moreover, are fragile creatures often requiring the attention of *two* adult females to bring them up. "Aunties" are common among the whales and dolphins to help the mothers.

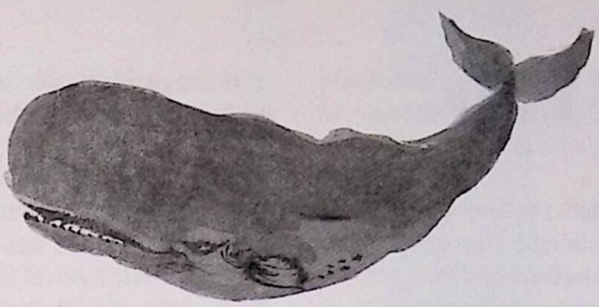
The ten-year moratorium is a vital scientific tool to learn whether the different species *can* make a comeback.

But the Japanese and Russians, so far from accepting the moratorium, even rejected modest conservation decisions taken by 3/4 majority votes at the 1973 IWC meeting. Taking advantage of the hopelessly weak provisions of the IWC, first Japan and then the Soviet Union filed formal objections which gave them a free hand in killing minke whales, the smallest of the baleen whales, and in disregarding by-area catch quotas of sperm whales. Japan also rejected the vote which would have ended fin whaling in the Antarctic by 1976, though the Russians stuck to that decision.

The United States' reaction was strong. A cable to the Government of Japan, signed by Secretary of State Henry Kissinger, stated, in part, "Such wholesale disregard for the views of all other (IWC) member nations with few exceptions leads to several questions. Why should there be a Commission if its decisions can simply be ignored? Why should the (IWC) Scientific Committee prepare recommendations? And why should twelve of fourteen member nations push for improvements in the International Whaling Commission, if progress made can be destroyed by one or two nations? The United States Government is extremely disappointed with the backward step occasioned by the Japanese objections and it is hopeful the Japanese Government will reconsider."

The Japanese Government did not reconsider. The reaction of the whalers was to hire public relations firms to try to assuage its critics who were becoming steadily more vocal.

On December 21, 1973, Senator Warren Magnuson (D., Wash.) Chair-



man of the Senate Commerce Committee, together with Senator Claiborne Pell (D., R.I.) and Senator Ernest Hollings (D., S.C.) introduced S.J. Res. 184 "to protect whales and certain other living marine resources." A similar resolution was introduced in the House of Representatives by Congressman Alphonso Bell (D., Calif.) and Congressman Donald Fraser (D., Minn.).

On May 30th, Congressman John Dingell (D., Mich.) introduced H.R. 15039 to amend the Fishermen's Protective Act of 1967 to increase the ability of the President to ban the importation of products from countries that violate the spirit of international agreements for the conservation of marine resources. As it now stands, only fishery products can be embargoed by the U.S. Government. Under the Dingell bill and the even stronger Magnuson bill, S. 3575, introduced June 4th, all products would be subject to embargo, a powerful weapon for obtaining a change in the unbending attitude of the Japanese whaling industry. Moving rapidly for action on his bill, Congressman Dingell scheduled hearings for June 10th.

An interview with Senator Magnuson by *The Washington Post*, May 31st, stated: "To bring Japan around Chairman Warren G. Magnuson of the Senate Commerce Committee and other lawmakers have introduced bills to impose an official government boycott of Japanese goods.

"Besides that pressure the State Department warned Japan earlier this month that the United States might resort to banning the import of Japanese fishing products if the whale slaughter continues unabated.

"Already a coalition of private conservation groups have organized a boycott of Japanese goods of all kinds in an attempt to persuade Japan to spare the whales.

"'I hope this meeting means the Japanese realize everybody has to practice conservation,' Magnuson said last night. Then referring to the boycott he is advocating, Magnuson said of the Japanese: 'To coin a phrase, they've got bigger fish to fry than catching whales.' "

The President of Nissan Motors in the United States (manufacturers of Datsun) agrees. In a letter to the Japanese Consul in Los Angeles, he wrote: "I know you are aware of the tremendous amount of adverse publicity which Japan has received in connection with the harvesting of whales. At this time, however, I am obliged to call your attention to public pressure now being directed at Japanese companies doing business in the United States.

"Our company has received hundreds of letters from concerned people who are saying they will not purchase Datsuns or any other Japanese products until the excessive killing of whales is stopped.

"Such a boycott of Datsun products is especially ironic for our company. As you may know, we originated the 'Drive a Datsun—Plant A Tree' promotion in 1972 and as a result, planted 250,000 trees in United States National Forests. This idea was subsequently used in Japan and other countries and many more trees were planted around the world. Nissan has always advocated ecology and has always tried to be a good citizen in countries where it does business—hence, the irony of being threatened now in connection with an ecological issue over which we have virtually no control.

"I feel that the concern of the people writing to us is real. These concerns should now be fully made known to the government of Japan and we are asking that you please convey these latest developments to the proper people."

So many whales have been killed and the populations so drastically cut that the Japanese whaling industry is already being forced to reduce the numbers of vessels it plans to send to the Antarctic next year. This follows a pattern set by whalers in previous centuries. When whales become too few to make a voyage profitable, whaling tapers off or stops abruptly. It was thus with the blue whale, a species IWC nations have been forbidden to kill since 1965, when it became commercially extinct, but the blue whale has not recovered.

Only a general moratorium can save the whales, and if that moratorium is won, it will be the first time in human history that whalers spare whales while there is still money to be made from them. But it is also the first time that large numbers of people have banded together to boycott to bring respite to the whales, and the first time government embargoes have been advocated by statesmen of a major nation.

The world is calling for an end to commercial whaling. The 58-nation United Nations Environment Program unanimously endorsed the moratorium in Geneva in 1973 and Nairobi in 1974. But the call has fallen on deaf ears and only economic sanctions against the offending nations stand any chance to prevail. It is the strength and vigor of those sanctions that will be tested in the very near future. There is no time for protracted negotiations, for whales of all kinds are expected to be commercially extinct within a decade. When they cease to be a functioning part of the ecosystem because of their reduced numbers, the results of millions of years of evolution will be suddenly reversed. No one knows what the effect of such an event may be. But it is not only enlightened self-interest which should lead the nations to stand firm in this ecological struggle to save the symbol of the Stockholm Conference. We all must share the guilt if the creatures with the largest, most convoluted brains in the world are destroyed, and destroyed cruelly, forever, for petty commercial greed.

The Unmatched Pair

By Helen Ward Gall © 1974

If anyone had told my grandmother that she was somewhat of an ethologist, she might have bristled with indignation and protested that she was no such thing, but a good Methodist, or whatever. She wouldn't have known about the science of animal behavior, and the conditioned reflexes and release mechanisms that operate animals like wind-up toys—or do they?

The word ethology itself is not new. It is defined in my unabridged Webster's International Dictionary of considerable vintage as (1) the science of character, (2) the study of manners, customs, and mores. Relatively new as a science, ethology embraces the formal study and documentation of animal behavior in natural and imposed situations, and may take a while yet to establish itself in the public vocabulary along with its sould-alike science, ecology.

Ethologist Konrad Lorenz' charming book, *King Solomon's ring*, explores at layman level such things as the capacity for emotional response of a jackdaw, a shrew, a graylag goose, and others, through association with them in his home. Specialized works such as *The Comparative Ethology and Evolution of the Sand Wasps* are appearing in increasing numbers on publishers' book lists. Behaviorists are assessing whether a male robin fights off another as a threat to his domestic tranquility, or because the color of the other's breast just makes him see red. More and more, scientists are delving into not only the interesting and amazing habits and sociology of animals, but their motivation.

But, in her own way, Grandma was somewhat of an ethologist, even as you and I. She knew that Bossy was more likely to kick the pail over if the milking stool was placed on the side with her bad eye, and that Dobbin pulled the rig home from church faster because he knew there would be an apple and a lump of sugar awaiting him in his stall. She knew where to look for a "stolen" nest under the blackberry bush by imagining herself the broody hen and asking herself where she would have hidden it, had she been Biddy.

And aren't you always making at least mental note that the dropped nestling you raised seemed to think you were his mother, and that the aggressive woodpile chipmunk gets more peanuts than shy Half-tail who lives under the flagstone patio? You have been making firsthand observations on the implanting of the parent image, and on the pecking order among animals, whether or not that is what you called it. You may have noticed that a squirrel who usually takes nuts from your hand all of a sudden one morning backs off as though you had struck him a blow on his tender nose. Of course, you probe your mind for a reason, and come up with the solution that you have recently had your hands in chlorine bleach or even a sweet-smelling lotion, interfering with your scent with which he had become familiar.

There! You see, you, too, are somewhat of an ethologist. To qualify, you don't need a laboratory with different colored drawers, strings, and bells to test animal behavior, and you needn't climb a ladder and peek into a bird's nest to note the number, color, and size of the eggs. Someone has been there before you. The statistics are all neatly recorded. Nor is the real fun of bird-watching confined to compiling long lists of identified species. It is your own observation of the reaction of wildlife to you and each other and to changing situations that gets you a degree in backyard ethology.

Thank goodness, with eminent zoologists documenting such findings as "Animals are Only Human" (Jean George, Readers Digest, Nov. 1973, condensed from *International Wildlife*), the ascription of human traits to animals is no longer considered the mark of an emotional spendthrift, nor anthropomorphism necessarily synonomous with simpering dowagers lisping endearments to perfumed poodles. Yet, not too many years ago, an editor (not this magazine) took issue with me for saying that the mother duck quacked anxiously when her "babies" strayed too far from her, because I was equating ducklings with human infants, and, anyway, how did I know the mother was anxious? All I could state with certainty, he said, was that the female *seemed* to be anxious when her young strayed.

At North Point we are always speculating as to why a particular bird or animal has behaved in a particular manner, but we offer our theories only as isolated incidents and not necessarily as behavioral patterns of like creatures under like conditions, as in conducted studies. As a matter of fact, our own findings are often at variance with each other. Some years ago we chronicled a female mallard day after day leading a blind drake around like a faithful seeing-eye duck, which might have suggested that ducks give special consideration to the weak and afflicted, whereas, the contrary is more often true, as in most forms of animal life. On the current scene, a blind mallard released after many months in protective custody has now been making it on his own at North Point for a full year. Far from being nice to him, the others are often mean to him in small ways, either ignoring him completely or making little jabs at him if he walks too close to them when they are picking up corn from the ground.

There is a second blind drake in the flock, and these two sightless ones often come together to the feeding area in front of the garage after the others have left, which gives rise to another speculation. We have seen many instances of the lame, halt, and blind seeming to join forces, but I suppose these could be rationalized as coincidences of each one having sensed independently that he made out better when his stonger relatives were not there pushing and shoving, rather than planned united action. Similarly, I suppose the apparent compassion of the

Encompassing North Point

"seeing-eye duck" might be explained as the normal pairing instinct asserting itself over the urge to shun the weak.

We have often noted that most of the casualties on this lake find their way to North Point sooner or later, much as gentlemen of the road were said to find easy marks by the "X" on the door left by predecessors; but on the side of rationalization, our peninsula is a large headland jutting out into the north end of the lake, almost impossible for waterfowl to miss when swimming from east to west.

Be that as it may,

One day when the winter had scarce
turned to spring
We noticed a goose with a poor
broken wing:
A Canada goose, at our
Jersey lakeshore—
A foreign ambassador,
right at our door!

We watched the lone goose come out of the lake and head purposefully up the slope toward the house, across the flagstone patio and right up to the full-length glass doors, as though she knew just what she was doing, but our pleasure at having a Canada goose on our doorstep was overshadowed by the sight of the big wing drooping at her side, almost trailing the ground with its tip.

It seemed she had come to us
asking for aid,
So needful of help that
she was not afraid.

When I opened the door to step outside, she backed off a little, hissing and sticking out her pink tongue, but took the profered bread from my hand. When she had had enough she marched with slow dignity back to the lake, continually moving her shoulder in an effort to lift the useless wing and cup it to her body where it belonged. On the water, relieved of the weight of the dragging appendage, she was more at ease.

As she swam off, we found ourselves almost wishing she wouldn't come back so we wouldn't be faced with the decision of what was to be done about her; yet we were relieved when she showed up the next day. "Here comes MacKenzie again," we said, using the name of the only Canadian dignitary to come to mind, that of a one-time prime minister.

Again she came to the house to be fed, but this time she didn't go back to the lake. Instead, she spent the day alternately pacing around the grounds in a nervous fashion and dozing on the lawn when she got tired. This went on for several days, while we hoped against hope that her injury was a temporary dislocation that would right itself with rest. We were hesitant to interfere; a veterinarian might say she should be "euthanized." It is always hard to know when to get into the act and when to stay out of it. Animals sometimes make miraculous recoveries in the wild, and we didn't want to deprive her of this birthright. But as the days passed, we could see her weakening. She stopped going for walks and lost interest in food. She spent most of the day just sitting on the lawn, not going back to the water until the sun went down. She still held herself proudly erect, but walked more and more slowly and didn't bother to try to raise the wing anymore.

It was clear that she was not going to recover in natural course, and we couldn't simply watch her fade away. At this point we felt that anything we might do, if it did not improve her situation, would at worst only be accelerating the inevitable.

It wasn't hard to corner the weakened goose, and for the first time we were able to examine the wing. On the underside was an ugly, festering wound, and we rushed her off to the animal hospital without further delay.

An X-ray showed a bullet lodged in the shattered joint between the upper and lower wing sections. The bones could not be pinned together, for they had already been infected by gangrene. It was problematical whether amputation could be made above the spread of infection, but we rejected the only alternative. We consented to the surgery. She would have to stay overnight, and we drove home in silence, feeling as though we had delivered her into the hands of the enemy and would be personally responsible if she did not pull through. But then, we would have felt that way if she had died and we had *not* tried to help her, too.

The next morning we telephoned as soon as we dared, and received the glad tidings that MacKenzie had survived the operation and could be picked up later in the day. It would remain to be seen whether the infection had been confined to the amputated wing, but MacKenzie was coming home.

We went to the doctor
to pay up his bill—
He shook his head sideways,
and said it was nil;
We shook our hands up and down,
saying, "Oh, yes!
It's we who have brought
you a goose in distress!
It wasn't your notion
to fix up the bird—
We caught her and brought her,
so don't be absurd
And let's have no more
of your negative nods!"
The doctor replied,
"It's not your goose—it's God's."

Mac sat in my lap on the way home, still numbed by the chloroform of which she reeked, trembling with postoperative shock. Where the wing had been, there was only a stub with flesh sewed over it, the surrounding feathers matted and bloody. I carried her into the house and put her in a large cardboard box, where she just stood, weaving wearily, until she collapsed from fatigue. Off and on during the night I dipped her bill into the water, as she seemed too dazed, even, to help herself to a drink.

We had planned to keep her while the wound was healing, but the next day when we put her outside in a wire enclosure near the water she did nothing but walk around in circles in such evident distress that when several hours had gone by with no let-up, we released her. Undoubtedly anxious to rid herself of the hospital smell, she went directly into the lake and spent a good half hour preening and bathing.

No longer encumbered by the dead weight of the wing, she even tried tip-ups, a waterfowl maneuver performed by plunging the head and neck into the water so that the tail is pointing straight up into the air, while the feet paddle to maintain that position. She didn't make out well at first, as she would lose her balance and fall over on the side that was heavy with wing. Good as it was to see her wanting to do these things again, it was sad to see her trying to cope with an impairment she did not understand. It didn't taker her long, however, to adjust to her new distribution of weight and do her tip-ups like any whole goose. Since she had shown us plainly that she preferred her own way of convalescing to our more clinical plan, we didn't try to recapture her.

The goose soon recovered,
in all things save one:
The days of her flight and
migration were done.
No more would she fly
with the moon on her wing
At harvest time southward,
and home in the spring.
Alone, as the echo
of flocks honking high
Fell down on the hills
and her answering cry—
The lake for her home and
and its north and south shore
The polar extremes
of her world evermore.

We could not contrive
to ensnare her a mate—
The life of an exile seemed
destined her fate
Except for the mallards
and seagulls and coots
For whom Miss MacKenzie
did not give two hoots.
We joyed in her friendship,
but oft our delight
That she had recovered
was dimmed by the sight
Of one lonely goose
swimming off in the gloom
That swallowed her up
and invaded our room.

For us that was the beginning of a long association as filled with anxiety as enjoyment. The very fact of her having been shot down over the lake was an uneasy reminder of the many dangers that face even unimpaired wildlife, and these risks were a part of her freedom. Her handicap put her in double jeopardy. We tried to rationalize that surgery had given her a reprieve from certain death and that every day she lived was an extra dividend, but it didn't lessen our fears for her safety. Worse luck, she did not spend nights under our protectorate. At the close of each day she could be seen swimming off into the gloom toward the other end of the lake, and there was nothing we could do about it. We even built an island in the shallow water about 25 feet off our shore, vainly hoping she would spend the nights there in safety.

Off and on during the summer, groups of Canadas dropped in, but they never showed any interest in our singleton. Before long they would be gone again, without even getting acquainted. It was perhaps just as well, since she couldn't have gone with them when they departed.

Fall migrants came and went, and temperatures dropped to freezing. As usual, the ducks kept the water open at North Point, including the area around the island we had made. With the rest of the lake frozen, Mac could no longer go swimming off to the south at night, and we thought we had her locked in here for the winter. Instead, we were faced with a new anxiety. It hadn't occurred to us to what lengths she would go to keep her compulsive tryst with the other end of the lake. Toward the close of each short winter afternoon she would climb out of the water onto the ice, facing south, honking restlessly as she prepared to leave. She would stretch as high as she could on her toes, flapping her one big wing as she made the instinctive take-off run that would never get her airborne, and start her long walk to the other end of the lake. We watched until darkness and distance swallowed her up. What a relief it was, in the first gray light of morning, to see her emerging from the mist down the lake! She advanced purposefully toward North Point with measured stride, head high, making her disability seem a queenly attribute. She did not even shift into undignified haste coming down the home stretch to where I was waiting onshore with the corn to see that she got her share.

Our concern grew as the ice thickened. Not only could nocturnal predators now track Mac down while she slept on the lake's frozen surface at the south end, but skaters and their dogs appeared in increasing numbers. The last day of the year, the lake looked like a Currier and Ives print: red, blue, green, and yellow-jacketed figures gliding over the ice, sprawled on the ice, and pulling sleds with tassel-capped youngsters bundled into boxes. People kept coming to the edge of the open pond to look at the ducks and geese, often accompanied by unleashed dogs that thought it great sport to lunge at ducks dozing on the ice, chasing them back into the water in a great commotion of quacks and splashes. Mac, too, sometimes dozed on the ice, and was not as agile as the ducks about getting back to the safety of the water. We spent a thoroughly miserable Sunday afternoon keeping watch from the window, becoming more apprehensive as the time neared for Mac to start on her mile-long hike. With dogs having the advantage of her on the ice, we had a feeling that this time she wouldn't make it.

The imminence of her departure as the sun got lower forced us to a decision. Mac had to be taken into custody, if we could catch her. It might not be quite as easy this time, as she was now in vigorous health and could move quickly. She would first have to be lured out on land, far enough away from the water so she couldn't make an end run around us and back into the lake when we moved toward her. If we missed, we weren't likely to get another chance.

Luck was with us. She came out of the water for the bread I held out to her, and Ronnie got between her and the lake as I drew her farther away. We cornered her as planned, where we had stretched a length of wire, but the hullabaloo must have convinced all within earshot that we had suddenly decided to have her for New Year's dinner. She honked loud and long when I grabbed her and carried her to the large, unoccupied dog run, but as the evening wore on her cries subsided in quiet defeat and she just paced. Back and forth, back and forth, from one end of the pen to the other. The thought of the lonesome goose pacing in the darkness left no room for festivity in our holiday eve. We checked on her all through the evening, and the sounds of the old year had been long absorbed into the midnight sky before she settled down on the straw we had placed in a lean-to shelter in the corner of the pen nearest the lake. In the morning we added bathing facilities—a big washtub equipped with electric water-warmer to keep it from freezing, with a ramp that enabled her to climb in and out. After throwing the water over her back and preening her feathers, she sometimes tucked her head under her wing and went to sleep there in her private mini-lake. It wasn't much of a way of life for a goose, but it was a life, at least.

February was unusually warm, and by early March winter's hold had been broken. There was a wide moat all the way around the lake separating the shore from what was left of the waterlogged ice; coves and inlets were entirely free. We decided it would be safe to release Mac.

We arose early on a Sunday morning, full of the anticipation of seeing her pleasure at going back into the water; but we had *not* anticipated the sight that greeted us—the first of the homeward-bound migrants, in the lake just off our shore. Too excited for breakfast, we hurried to release Mac so that she might mingle with them and perhaps find new friends.

When the door of the pen was opened she walked out with her accustomed dignity, in no hurry to reach the water. She picked at the greening grass as she went, paying no attention to the geese who came in closer, in a body, to stare at her from the lake. They kept their distance, watching quietly, while Mac made her way to the water's edge and took a long drink; but as soon as she stepped into the lake, they moved in on her.

We ran along shore shouting and waving our arms in an effort to break it up, but to no avail. There was a great deal of trumpeting and splashing as big wings beat the water. Soon everybody was fighting with everybody else, and Mac slipped away unnoticed. She put distance between herself and her assailants as rapidly as possible, and was soon gone from view.

While the geese were engaged in a fight, the origin of which was no longer important to them, one loner stayed out of the arena, and we could see that he was not like the others. His head and neck were white, splattered with dark gray-brown freckles, instead of solid black with white face patches extending under the chin like the Canadas. As usual, we speculated as to the whys and wherefors: Did he remain aloof because he was snobbish, or was he forbidden their society because of his nonconformity? We weren't to learn immediately, for by the end of that warm, windy day the geese had all disappeared. So had the ice.

The next morning, before we were up, a familiar honk from the lawn called us to the window. There stood MacKenzie and the freckle-faced gander, side by side. The two misfits had found each other.

'Twas love at first sight
when he spotted Miss Mac:
Like him, she was shunned
by the rest of the pack.
Attracted by each other's need
they were drawn
And he stayed behind
when the flock travelled on.

She proudly displayed him,
like any new bride
Just bursting to show
the new groom at her side,
Content that she'd bested
all geese in the air:
By him she'd been chosen
the fairest of fair.

Since it seemed she had brought a suitor home for us to approve, or be approved by, or perhaps to show him what good things were in store for him if he would stay, we quickly ran for the bread—the best way we knew of showing the newcomer he was welcome. Of course he refused hand-feeding on this first visit, but we were able to observe him at close range as he ate from the ground. Unlike MacKenzie's, his feet and legs were yellow, and he had a pied bill of light and dark pink, mottled with black. Mac's bill and feet were dark gunmetal. We found from our bird book that the white-fronted goose has yellow feet and legs, and is quite similar to the Canada in outline and body color. Cross breeding between the two might have produced the spotted, coach-dog effect, we thought. Blue goose and snow goose backgrounds were other possibilities, but we weren't especially concerned with what an ornithologist might have called the strange one. Because of his spots, we called him Dalmatian.

All through the spring other flocks arrived and departed on their northward migration, but Mac and Dal lived in a world of their own and paid no attention to the voyagers. It still remained to be seen whether he could resist the more crucial southbound migration and face the winter with her.

August and September slipped so unnoticeably into a glorious Indian summer that we were hardly aware of the change of seasons. Occasional early migrants started dropping down to rest on the lake before continuing their journey, and still "our" two geese swam around North Point and dozed contentedly on the lawn in the warm midday sun.

He may have been puzzled
to understand why
His poor grounded mate
was unable to fly,
But patiently folded his wings
on his back
And walked, swam and
slept at the side of Miss Mac.

Whenever we heard geese on the lake at night we waited anxiously to see if Dalmation was still with Mac in the morning, and he always was. He seemed to have cast his lot with the grounded goose, sacrificing his own ability to fly wild and free. December found the pair still together, and we were able to catch both and house them for the winter.

Who is to say why the freckled gander did not join the others in their attack upon the one-winged goose, and why he stayed behind with her when the flock travelled on? Only MacKenzie and Dalmatian knew the answer to that, and even they, perhaps, did not try to understand the forces that drew them to each other.

Elkins Park Students Dig Ecology

Planting an organic garden. . .

> *However this earth came to be, it is here to be shared by all animals, including man. The human species is animal like all others, but man is the most intelligent. Humans want to dominate, they do not understand they have to share the earth. . . . There is a balance of nature, and every animal is part of it.*
>
> Michelle Rivlin
> Mary Bartik

Judging from this quotation, the Misses Rivlin and Bartik have a solid understanding of the importance of ecology. That they feel so strongly is not uncommon in this era of widespread ecological consciousness. What is unusual is not that these writers are concerned, but that they are also 7th graders. They are two of 53 students participating in an innovative teaching program developed by four team teachers at Elkins Park Junior High School in Philadelphia, Pennsylvania. The students involved had the rare opportunity of spending the last school year studying ecology.

The special environmental curriculum did not sacrifice the more traditional subjects but rather worked ecology into all of them. In successive six-week units, the students studied many aspects of ecology ranging from air and water pollution to wildlife.

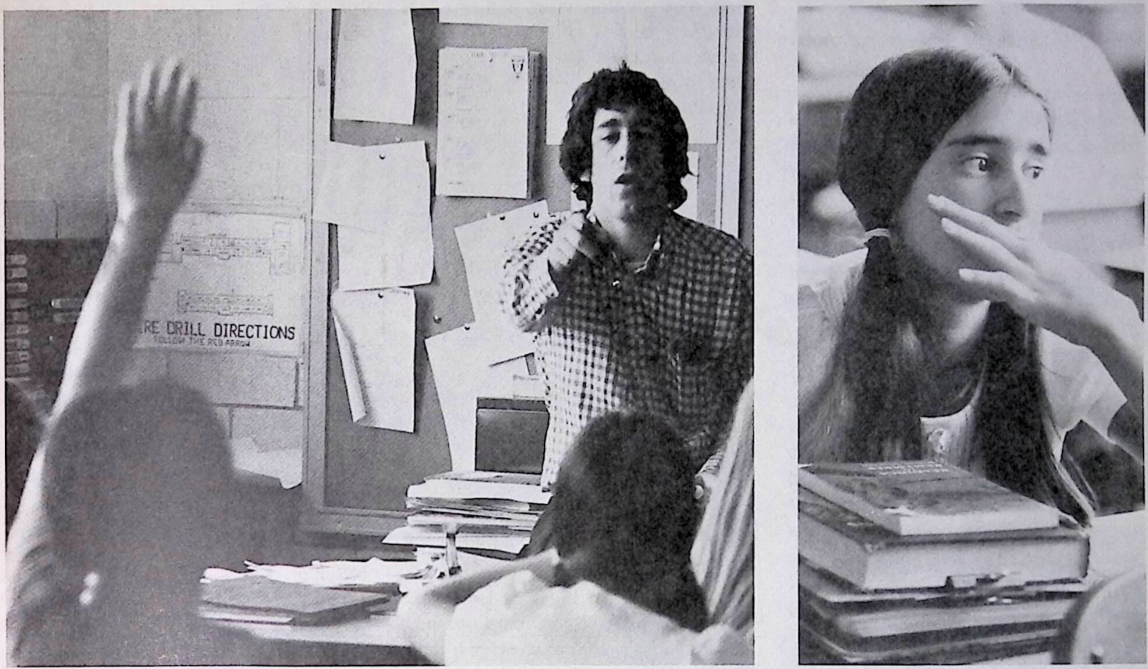
During this unit of study, the students supplemented their classroom work by creating wildlife board games, writing and broadcasting wildlife "commercials" over the school public address system, and visiting the Philadelphia Zoo and Museum of Natural History.

At the end of the endangered species course they prepared research papers about one particular species, incorporating what they had learned in all of their standard courses. The papers were extensive and extremely impressive. For example, in their paper on whales, Stewart Gritz and John Spandorfer wrote: "We have written letters to a few places to stop the killing of the whales. One of John's friends mailed us a petition to have signed to stop this killing. We had all of our friends and families sign it and return it. We hope that many other young people will get started on this type of study so that they may help save endangered animals.... Only man could put the whale to near extinction. Only through man's united effort can the whale return to its rightful place as the king of the oceans." These students obviously learned a great deal.

This program is in its second year at Elkins Park and hopefully it will continue. Because of the efforts of the teachers, Larry Jacobs, Jim Levin, Charles Whiskeyman, and Mike Houghton, the prognosis looks good.

The practical knowledge of ecology that these students gained was invaluable, but even more importantly, they were instilled with an abiding respect for nature and wildlife.

Text and photos by
Deborah Duff
Defenders of Wildlife



Talking about wildlife . . . thinking about it . . . getting your feet wet

Conclusion of two-part feature

Piggy Wears Out His Welcome

By Raymond "Sandy" Davis
Defenders of Wildlife

Sunrise in June at the Canelo Hills Sanctuary coincided with Piggy's awakening and the end of sleep for Polly and me. The door of our bedroom, which was part of the old section of the ranch house built in 1882 with adobe walls and a ceiling made from the ribs of the saguaro cactus, opened eastward onto the porch. We seldom closed it on warm summer nights, and Piggy was at the entrance demanding admission shortly after the Cassin's kingbirds started their dawn bickering from the cottonwood trees over the driveway. For a time we would put up a card table and attempt to have breakfast on the porch, but his aggressive attempts to climb into our laps, then onto the table to investigate the fare, forced us to retreat indoors.

After his own breakfast, Piggy would usually enter a protracted play period. He loved to play with bones, sticks, rocks, or any objects he could steal from the house, mouthing and worrying them like a puppy. One particular limb from an oak tree excited him to a frenzy, leading to mad dashes around the house, punctuated by much tossing of the stick in the air and squeals of mock rage. When Polly hung out laundry, Piggy always lurked nearby, his long back hairs bristling with anticipation. Sheets had to be hung in such a way as not to dangle, and she carried a short length of cane with which to tap him sharply on the nose when he came too close. Nevertheless, laundry day was often a catastrophe. The wind tended to come to Piggy's assistance, and a flapping sheet eventually shifted position enough to be seized in his jaws. Then his exuberance reached its ultimate limits. After a quick jerk Piggy was off on another sprint, the sheet billowing behind him like a sail. Small objects like socks were safe for the most part, but Polly finally had to dry bedclothes in the house.

Even at an elevation of 5,000 feet, the midday temperatures could become oppressive, and Piggy observed a siesta that sometimes lasted until the hill behind our house threw a long shadow out toward the marsh. His favorite bed, which he used at night as well, was a canvas-covered butterfly chair on the porch. The chair became muddy and tattered and was never again fit for human beings, but Piggy curled up in it, drowsily content, for hours on end. An alternate site that was cooler still as the dry season drew to a close was a dust wallow dug at the base of the west-facing wall. When the rains began, this was converted to an admirable mud wallow, and when the red clay finally dried on him he trotted about resembling an animated ceramic pig.

Piggy never gave up trying to get back into the house, and occasionally he would succeed. When one of us misjudged his ability to dart past an opening door, he would be in, with one objective always in mind—the living room sofa. We seldom succeeded in heading him off, and once he was up on the sofa he invariably crowned his triumph by depositing a generous puddle on one of the pillows. Piggy never had much talent as a diplomat, and he planted the seeds of banishment early in the summer.

Shortly after coming to the Sanctuary, Piggy revealed an unpredictable side to his nature that became increasingly troublesome as the summer passed. He started to bite people. At first, when his teeth were small, his nips were rather innocuous (except to our two-year-old daughter Deanna), but as the weeks passed his canines grew quite formidable, and we had a serious problem on our hands. The situation usually developed as follows: Piggy would trot up to someone, either Polly or a visitor, and initiate a vigorous leg examination with his flexible, wet, and often muddy snout. A series of low grunts accompanied this procedure. Then, totally without warning, he would seize the person's calf and clamp down sharply. With strangers, this activity was generally territorial. When a carload of people (most visitors were birdwatchers) drove up, Piggy would often receive them with bristling hostility, teeth clashing like castanets. His behavior was only partly bluff; he usually followed through on his threats. Probably his most eminent victim was Paul Martin, the paleontologist from Tumamoc Hill and one of his first benefactors. Paul was confronted one afternoon on the porch and promptly bitten on the leg. "He always was an imperial pig," said Paul succinctly. Piggy was thus momentarily forgiven.

Because of Piggy's talents as a watchdog, Polly tacked a sign to the Sanctuary's entrance gate, warning guests to remain in their cars until he was properly incarcerated. This was easily accomplished by luring him into a small adobe bunkhouse with a basketful of apples, then shutting him in until the coast was clear. We also kept him away from visiting pets, for he could have more than held his own with any but the largest and most aggressive dogs.

Being a member of an intensely social species, and craving companionship, Piggy would usually become friendly after the initial flurry of excitement. When I called him, he always came running like a dog, and if he caught me squatting I was immediately overwhelmed by the ubiquitous wet snout on face and neck, with much affectionate mouthing of my hands. He never bit me, perhaps because our relationship was cemented in the long car ride down from Tucson (Piggy loved automobiles, but he could not be trusted to hold his water, so he was barred from any more trips while he was living at the Sanctuary).

Another of Piggy's basic social rituals involved thrusting his head be-

Don't let the grin fool you. Piggy liked to bite people Photo by Polly Davis

tween my legs and vigorously rubbing each eye against my skin, first to one side, then the other. This behavior has been frequently observed in wild herds, since javelina tend to be bothered by chronic eye irritation caused by a sticky secretion that gums the eyelids. Without another javelina (or, in Piggy's case, a person) to rub against, the animals are in trouble.

Piggy experienced ecstasy in many ways. When feeling unusually relaxed, he liked to drape himself over the edge of the stone porch, head down, his whole body taking on the consistency of a sack of oats. To complete the picture I was needed, in order to give him a thorough rubdown with my bare foot. These massages sometimes lasted fifteen minutes or so and would have continued indefinitely if I had had the patience to continue.

During our last year at the Sanctuary, Polly established an informal nursery school for the young children of neighboring ranch families. A couple of rooms in the old bunkhouse were set aside and adorned with posters and children's art work. In addition to toys, a considerable array of teaching and recreational equipment was also gathered. About half a dozen children participated, and in good weather most of the activity took place outdoors around a large cottonwood tree.

Piggy insisted on being enrolled in school the first time he saw the institution meet. He soon adopted the children as part of his herd, circulating among them with a great deal of eye-rubbing and snuffling. Nose pad pressed firmly to its target, he inspected each child from head to foot like a vacuum cleaner accessory being applied to walls and furniture.

Naturally, the children were delighted with Piggy. However, he did get into the schoolrooms one day with devastating results. Foam rubber blocks were torn apart and devoured, with no apparent ill effects. Easels and tricycles were overturned. Ripped from the walls, posters and paintings were converted to a heap of confetti. Boxes were ripped open and their contents strewn in a mass of rubble. Thus, in one more ingenious way, Piggy convinced his former admirers that ostracism was the only destiny that befitted him.

One clear, warm evening in August the whole family decided to camp in a little grassy valley beyond the edge of the trees on the east side of the creek. Piggy was encouraged to join us, since we were making every effort to interest him in nature and especially in the odors left behind by members of his own kind.

We set up camp in the open, Polly and I sleeping on cots, while Deanna was tucked into a crib that was covered with a mosquito net. As a full moon rose over the Huachucas, the grass shone silver against the black wall of the willow forest along the creek. The night air carried a faint suggestion of skunk.

Piggy was enthralled by an apparently endless variety of smells and sounds. We could hear him snorting and dashing about in the tall sacaton grass that grew everywhere in dense clumps. After an expedition of about an hour, he returned to camp, to discover that we were all asleep. This was an intolerable situation, so he flung himself on my sleeping bag and found that my protruding mop of hair made excellent forage, at least in the initial nibbling stages. When no longer in the mood for grazing, he proceeded to rip the stuffing out of my sleeping bag before rushing off once more into the darkness. By now, Polly and I suspected that our camping trip might well be turning into a shambles, but we were too sleepy to do anything but lie still and wonder what would happen next.

Piggy did not leave us in suspense for long. He returned at full charge, all attention focused on Deanna's snow-white potty, shining luminescent in the moonlight. He obtained an excellent purchase under the object with his nose, gave an upward flip, and the potty sailed about five feet into the air. The potty took a massive beating at intervals all night, but its sturdiness finally prevailed, and Piggy turned his attention back to us before it was destroyed. Failing to persuade me to join his games, he curled up on my cot and slept for the hour or so that preceded dawn.

Although constantly disillusioned, I never lost sight of the fact that my primary responsibility where Piggy was concerned was to induce him to take up habitation in the wild. There was a resident herd of six javelina whose territory included part of the Canelo Hills Sanctuary, and I made every effort to interest Piggy in signs of their existence. Up to the age of six months a young boar stood an excellent chance of being adopted by a strange herd, so I was guardedly optimistic.

Piggy delighted in taking long walks with me. My first duty consisted of introducing him to various native food plants that form the diet of javelina in the Canelo Hills. We generally started off in the morning, following the track down to the creek, past the vivid greenness of the *cienega* (When the monsoon rains begin in July, a rare orchid, *Spiranthes graminea*, blooms in the marsh, sending up a white spike, or cluster, of tiny white flowers. The species is found nowhere else in the United States but in this meadow and one other on Turkey Creek, a couple of miles to the southeast).

Beyond the creek, we explored the dry hillsides that rolled away abruptly toward the Huachuca Range, purple and mysterious on the eastern horizon. This was savannah country, with clumps of evergreen oaks standing out against the prevailing golden grasslands. Here, I introduced Piggy to nature's delicacies: the wet, fibrous interior of a century plant leaf; the fleshy pads of prickly pear cactus, the tubers of morning glory plants. Piggy showed only a perfunctory interest in such fare, but he did graze with enthusiasm on the tender green grasses that decided to get a jump on the rains.

Sometimes I took Deanna along in a backpack, and when we struck off at anything like a steady pace, Piggy's lack of stamina became evident. He tired frequently and often stopped to take naps in the shade of an Emory oak. Any uphill walk without a break left him panting heavily, especially if it was hot, but he generally followed us to the end. Occasionally he would give up if we hadn't gone too far, and from one of the hilltops east of the house we could make out his tiny figure trotting alone back toward the porch. Piggy would go anywhere with human companionship, but he never went alone more than a hundred yards from the house.

Piggy's favorite spot was a little grassy dell under the willows on the bank of O'Donnell Creek. I took him here often because the local wild herd had selected it as an afternoon siesta site. To reach it, we followed a narrow trail that paralleled the edge of the streamside woodland—a tangled growth of squawbush and coyote willow that formed an understory beneath a gallery of cottonwoods, walnuts, and massive Goodding willows.

The wild javelina spent several hours a day in hot weather dozing in a hollow beside a fallen cottonwood, and on several occasions Piggy and I flushed the animals from short distances. Piggy was interested in the strong musky whiff that lingered after they had dashed off, but he never showed any predisposition to follow them. He did spend upwards of an hour at a time rooting and sniffing where the javelina had been lying. Their feces were most intriguing, and he took intense pleasure in vigorously rubbing his scent gland against small trees in the area.

In the mud by a deep pool, where raccoons and white-tailed deer also left their tracks, Piggy discovered and exploited a wallow dug by the wild javelina. I often lay on the soft grass of the dell, looking upward at the deep blue Arizona sky through a tracery of walnut leaves. Sooner or later on these occasions Piggy would be on my chest, and in a short time I would be nearly as caked with mud as he was. These were happy occasions, the visits to the dell, but Piggy never lingered, always following me as soon as I started for home.

By late August it was obvious that Piggy would never make meaningful contact on his own volition with the wild herd. He was too acclimated to life with people. Even if we had wanted to keep him indefinitely we could no longer temporize with the fact that he had drawn blood from at least eight visitors. Most of them took their lacerations in good spirits, but the prospect of a lawsuit against the Nature Conservancy was now a real possibility. Somehow, Piggy had to move on. The question was: where? The Arizona-Sonora Desert Museum in Tucson had a surfeit of javelina and were not interested in Piggy. A zoo in Buellton, California might have taken him, but he also would have been confined in a pen by himself, an unthinkable fate for any member of a species as highly social as the javelina.

In time, the obvious and happy solution presented itself. The Aravaipa Preserve of Defenders of Wildlife, a wilderness of canyons and mesas some 70 miles northeast of Tucson, not only offered sanctuary, but had several herds of wild javelina. If Piggy could be transported to the Preserve and released, the chances of his joining his own kind (through sheer necessity) would be very good. Arrangements were thereby made for Doug Peacock, one of the wardens at Aravaipa, to drive down to the Sanctuary with a pickup truck and a kennel crate big enough to hold Piggy.

Everything went smoothly on the momentous day. Doug arrived with the necessary equipment, and Piggy entered the kennel without coaxing when he detected apples in the back. With a mixture of sadness and relief, we all tweaked his nose farewell through the wire, and he was off on his second and last long-distance ride.

Doug arrived at Aravaipa Preserve well after dark and decided to leave Piggy overnight in the crate. He remained subdued, and the next morning he was driven up to an old apple orchard on a mesa above the main canyon. Since summer was waning, ripe apples were in large supply, and many javelina were coming in every night to eat what they could glean from the ground.

Piggy was turned loose and promptly began to chase the pickup back down the track off the mountainside. However, he became discouraged by the dust cloud and the speed of the vehicle and gave up after following Doug for a short distance. He then returned to the orchard.

A few days later Doug visited the orchard in late afternoon and studied the terrain with a pair of binoculars. A herd of javelina was quietly foraging, but they trotted off and disappeared as he drew closer. That is, all but one. It started toward Doug, then suddenly changed its mind. Piggy wasn't about to turn his back on all those apples.

Year of the Tiger

By Robert M. McClung

Tiger, tiger burning bright
In the forests of the night.
What immortal hand or eye
Could frame thy fearful symmetry?
William Blake

On January 23, 1974, the Chinese New Year, the world entered the Year of the Tiger, as the Chinese record it. This comes only once every 12 years, since other years are named for 11 other animals—the rat, the ox, the rabbit, the dragon, the snake, the horse, the sheep, the monkey, the rooster, the dog, and the pig. You might say that all of these animals except two are accustomed to living with man, or close to his homes and settlements. Those two are the mythical dragon and the tiger.

Both of these fared best when they did not live close to man. But St. George finally slayed all of the dragons—and today the tiger seems to be going the way of the dragon. Man, whose population is constantly increasing, cannot stand to have any large and potentially dangerous animals living near him, or in competition with him. Witness the wolf, the mountain lion, and the grizzly bear, to mention just three of North America's endangered predators.

And yet tigers are universally admired, and are star attractions in any zoo or circus. All of us look at the tiger with fascination as one of the world's best-known beasts of prey. We acknowledge its grace and beauty. We use it affectionately as a symbol of power and strength: witness the amiable Exxon tiger, or the designation of the tiger as the mascot for Princeton, Missouri, Louisiana State, and other universities and schools.

To the one person in a million who really gets to know a tiger well, from the day of its birth, it usually becomes a big, affectionate, and overgrown pussycat. That is the way I think Helen Martini often thought of her many tiger pets and friends. Wife of the keeper of the big cats at the Bronx Zoo in New York, Helen had a unique and very definite way with baby tigers, gorillas, orangutans, and other young animals of every kind. For many years she was in charge of the Animal Nursery at the zoo, and looked after her many animal charges with tender loving care.

On February 8, 1944—over 30 years ago—the Bengal tiger "Jennie" at the zoo gave birth to three cubs. Like any kittens, they were mewling, squirmy infants. Averaging 20 inches in length from tip of nose to tip of tail, the three cubs weighed a bit more than two and a half pounds apiece.

Jennie was a nervous and unpredictable mother, so the cubs were taken from her and given to Helen Martini to raise at home. She gave the two male cubs the Indian names Rajpur and Raniganj and the female she called Dacca. Raised on the bottle, all three grew up tame and affectionate. Soon they got so big, however, that they had to be taken back to the zoo. There Helen continued to visit and care for them daily. By the time they were two years old, Rajpur weighed 438 pounds, Raniganj 436, and Dacca 311.

In 1949 I came to work at the zoo, and got to know the tigers. As adults, Rajpur and Dacca were especially beautiful specimens, lithe and graceful, and with rich tawny coats. By this time Rajpur must have weighed well over 500 pounds.

Have you ever petted a tiger, or heard one purr? Don't try it, I hasten to say, unless you know it *well*! And do it then only with bars between you and the tiger; although I'm sure Clyde Beatty, the circus tiger-trainer, might scoff at such a statement—for himself, anyway. Entering the big cat house at the Bronx Zoo, any friend of Rajpur and Dacca could talk to them and get a definite response—a deep, rasping, and rumbling purr, very different from the soft, smooth, and motorlike response of the typical house cat. But the sense of amiable well-being was the same, as Rajpur would come to the front of his cage and rub his huge orangey head against the screening while I scratched his forehead. He liked that. Dacca was a bit more standoffish, but tolerant of anyone she knew well. Helen Martini, the foster-mother to both tigers, was their favorite human being.

Dacca and Rajpur were mated, and in May, 1948—when both were a bit over four years of age—Dacca gave birth to her first litter of cubs. Between 1948 and 1959 they had 11 litters—32 cubs in all. Twenty-eight of these were fully reared, and some of them can still be seen in various zoos. One of the cubs was named "Princeton" in honor of my alma mater in New Jersey.

The International Zoo Year Book for 1971 records 392 Bengal tigers and 296 Siberian tigers—688 in all— held in zoos throughout the world. It is probable that many specimens in Chinese and other Asiatic zoos, as well as many in circuses and private collections, were not counted in this tabulation. The total number of captive tigers at that time was probably well over 1,000; and the captive total today must be kept close to that figure.

When kept under proper conditions and given good care, as in a well-run modern zoo, tigers will breed in captivity. Such captive specimens help to preserve the species. But tigers in captivity will never take place of those living wild and free in their homeland. Preserving a wildlife species through captive propagation is a fine and valuable conservation measure, as far as it goes. It must never, however, take the place of an active program of preservation in the wild.

And wild tigers are in a crisis status today, no doubt about that. India, the home of the Bengal tiger, now has probably less than 2,000 tigers within its borders. A half century ago it boasted 40,000 or more. The unique races of tiger once found in Bali, Java,

Animals in
DANGER

and the Caucasus, are either extinct today, or their numbers can probably be counted on the fingers of your two hands. The population of the Sumatran tiger dwindles alarmingly every year. Tigers have almost completely disappeared from Korea, and in China and Siberia they are now very rare. The Indo-Chinese race of tiger still numbers perhaps two or three thousand, in spite of war, hunting, and jungle defoliation. But their population is fast being reduced, too. If the present trend continues throughout the tiger's range, the species may well have disappeared completely in the wild by the year 2000—just 26 years from now.

Why have tiger numbers dwindled so drastically in recent years? The answer would have to include hunting. . . poisoning. . . the fur trade. . . and, above all, destruction of habitat.

In the old days of British India, tiger hunting was the sport supreme for colonials and big game hunters from all over the world, as well as royal pastime of native princes and maharajahs. George Schaller, who has studied the tiger in its natural habitat, and who has written an admirable book on *The Deer and the Tiger*, mentions a maharajah who wrote to him in 1965 saying, "My total bag of tigers is only 1150." Only? The statement sounds almost apologetic, as though the maharajah is ashamed that he has not bagged more tigers—as perhaps some of his fellow princes have. But that kill, as recorded by a single hunter, is probably at least half the total number of tigers still living in India today.

In areas where they live close to man, tigers still prey on livestock such as cattle, buffalo, or goats. Sometimes they attack man himself. Years ago, Jim Corbett related some of his hair-raising adventures in hunting down man-eating tigers in his book *Man-eaters of Kumaon*. The danger from the big cats is still all too real in certain areas. Between 1967 and 1971, for example, an average of 76 people a year were killed by tigers in the Sunderbans district at the mouth of the Ganges River. Schaller concludes that "Man and tiger cannot coexist. Tigers kill livestock and occasionally man himself...man-eating is very rare, (but) a deep-seated fear of the cat nevertheless exists, the potential danger is real, and the killing of a tiger still confers status on the hunter, no matter how unsportingly it is done." Because of the danger to human beings as well as livestock, a reported 32 tigers were killed by poisoning in 1969 in one district of central India alone.

Illegal hunting and poaching have always been a factor in the tiger kill—and they continue to be factors today. The price of tiger skins rose tenfold from 300 rupees in 1953 to 3,000 rupees in 1969. What it is today I have no idea. Although the taking of tigers for the fur trade has now been outlawed over most of the tiger's range, the hides and other parts of the animal are still highly valued, and prices of up to $10,000 have reportedly been paid in recent years for a single skin.

Writing in 1923, a half century ago, A. de C. Sowerby described why the skin and body of the Siberian tiger was prized: "His thick winter coat fetches a high price in the fur-markets of the world, being worth far more than those of the Bengal, Persian, or Sumatran tiger. Not only is his skin of value, but his whole carcass; for the Chinese believe that the bones, blood, heart, and even the flesh of the tiger have medicinal properties of rare power, and will pay a goodly price for decoctions brewed by the apothecary that contain such ingredients as powdered tiger's knee-cap, or clotted tiger blood. The heart of the tiger is supposed to impart to the consumer the courage and strength of the tiger itself."

As the human population increases in India, Southeast Asia, and other tiger territory, the areas of suitable habitat for tigers gets smaller year by year. The more people there are, the more food is needed to feed them, the more land needs to be cleared and put into crops. As this process goes steadily on, tigers are being pushed year by year into tiny pockets of their former range.

Hunting, poaching, poisoning, habitat destruction: these make up the story of the tiger's decline throughout Asia. The same sequence and script can be applied to the decline of wolves, mountain lions, grizzlies, and polar bears in North America. It can also be applied to jaguars in South America; to cheetahs, lions, and leopards in Africa and Asia; and, indeed, to all of the big predatory animals wherever they may be found throughout the world.

Is anything being done, you may ask, to reverse this trend, to stablilize the tiger's wild populations, to protect and preserve those that remain? The answer, fortunately, is "Yes." Whether enough is being done, however, only time will tell.

By 1970, all of the Indian states had imposed a five-year ban on tiger hunting. In 1972 India made the tiger its national animal instead of the lion—of which, perhaps, 200 of the Asiatic race still survive in the Gir Sanctuary in Gujarat State in eastern India. That same year the newly established nation of Bangladesh proclaimed the tiger its national emblem too, and banned its killing.

In 1973 the World Wildlife Fund launched "Operation Tiger"—a wildlife conservation program set up to aid this single species, and designed to

raise at least $1,000,000 for tiger conservation. Most of the funds which are being raised will be used to establish large reserves where tigers can live under protection, and not in conflict with man.

The United States' Endangered Species Act prohibits importation of endangered wildlife species or subspecies—and this provision helps to protect various races of the tiger. In 1971, too, the International Fur Trade Federation voluntarily placed a ban on the use of tiger furs within the organization.

So, some progress is being made; and it is hoped that enough large preserves can be established in the next few years to safeguard populations of wild tigers in the natural state in all of the countries and regions where they are still found. Each individual tiger, it is believed, needs about ten square miles of suitable habitat in order to sustain itself, and breed.

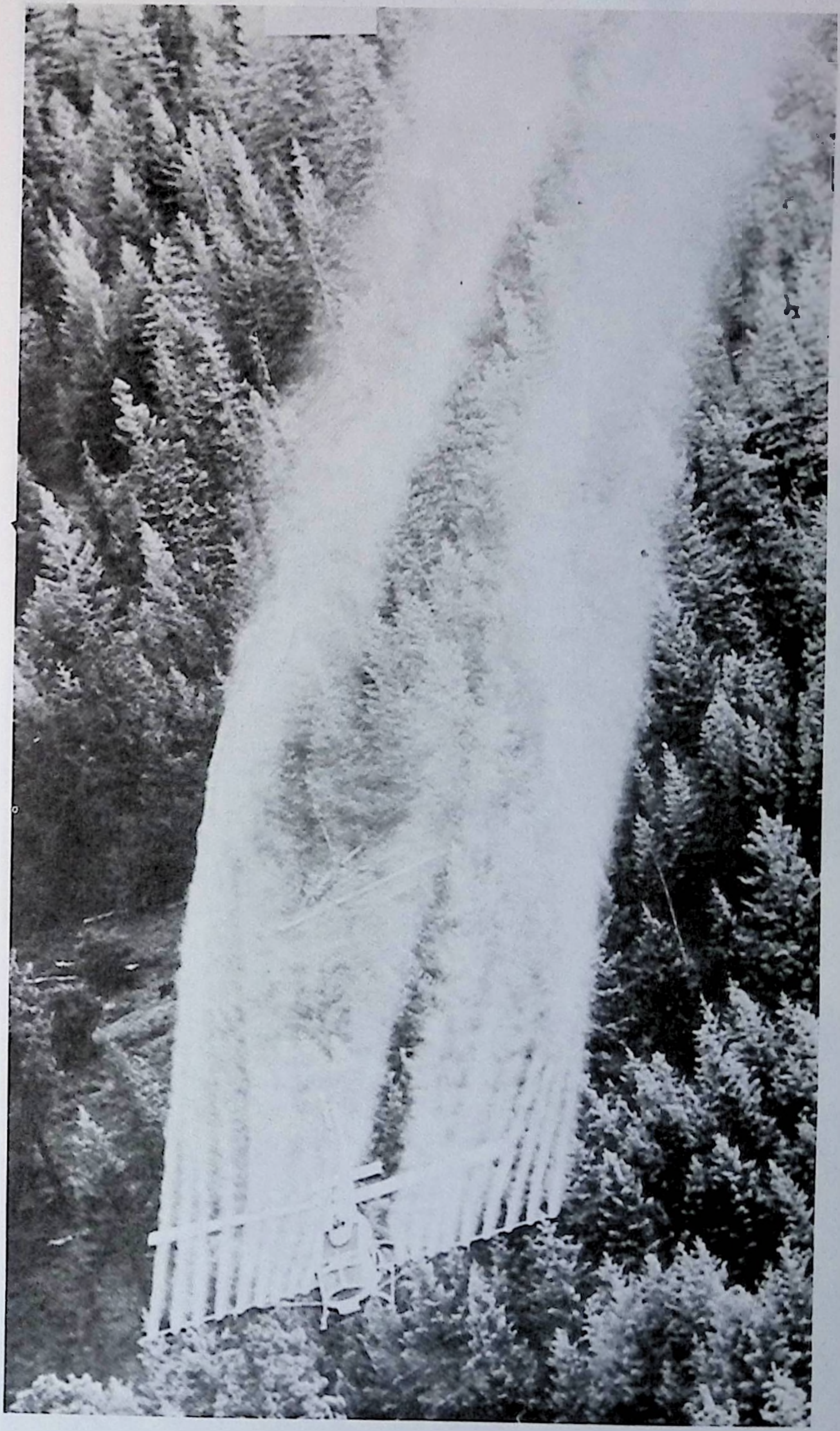
"The campaign to save the tiger," the *New York Times* has observed, "does not remotely imply failure to recognize the crying social needs of that other animal—man. But the saving of tigers—and whales and wolves, for that matter—is more than a cultural and esthetic compulsion. All the flora and fauna of the earth form an endlessly complex web of life, which man tears at his peril."

DEFENDERS OF WILDLIFE NEWS

Handsome Binder

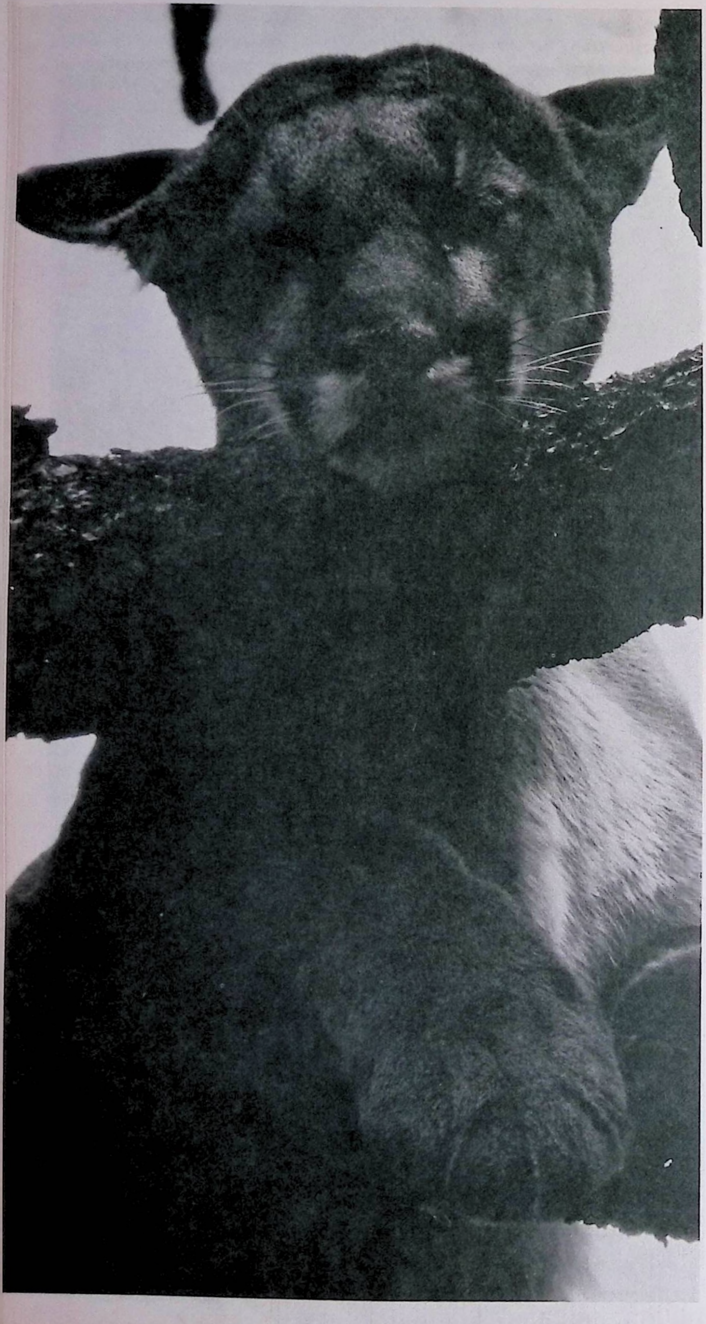
The perfect way to preserve your copies of DEFENDERS. Made of brown vinyl with gold lettering. Holds eight magazines. $4.00 each postpaid.

DDT Unleashed Again



A deadly fog of DDT streams from helicopter in Oregon's Whitman National Forest. Approved for use against the tussock moth, the pesticide spells doom for wildlife.

United Press International photo



Victim of
traps and dogs

Arizona Mountain Lion: Status Unknown

Article and photographs by

Aubrey Stephen Johnson
Defenders of Wildlife

The lion, a big male, was walking a high ridge in the Whetstone Mountains of southern Arizona. The trail he followed, though invisible to most eyes, was one that had been used for several years in his long and circuitous travels in search of food. The deep-set green eyes scanned the far sweep of the arid country below, alert for any movement that might mean prey. Up ahead was an ancient juniper tree, spreading shade and protection from the hot June sun.

Detouring slightly from the ridge, the lion walked under the juniper to repeat a ritual observed by all lions, male and female, who passed this way. The old tree had served as a scent post for many years, the dirt at its base repeatedly impregnated with urine.

The scent of man was noticed, but strangely ignored, as the lion walked under the tree. A large limb on the ground forced him to walk very near the trunk. At the narrowest point of this funnel formed by the tree limb and the gnarled trunk there was a smooth place about 12 inches across. The small area of smoothed dirt was bordered on all sides by small tree limbs, pointed rocks, and a few cactus spines.

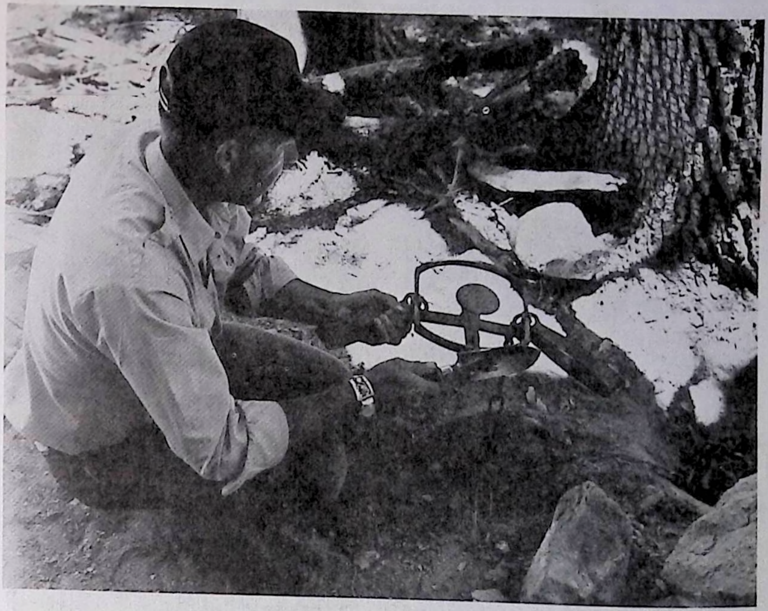
The huge front foot of the big male came down into the center of the small inviting area as he moved single-mindedly to leave his scent. A cloud of dust exploded into the air as the buried wolf trap closed tightly on the lion's paw. Simultaneously, the lion leaped into the air, touching the ground nearly 25 feet down the hill. The ten-foot length of heavy chain rattled behind the frightened cat for only a short time before the brush hooks at the other end suddenly stopped the lion's flight.

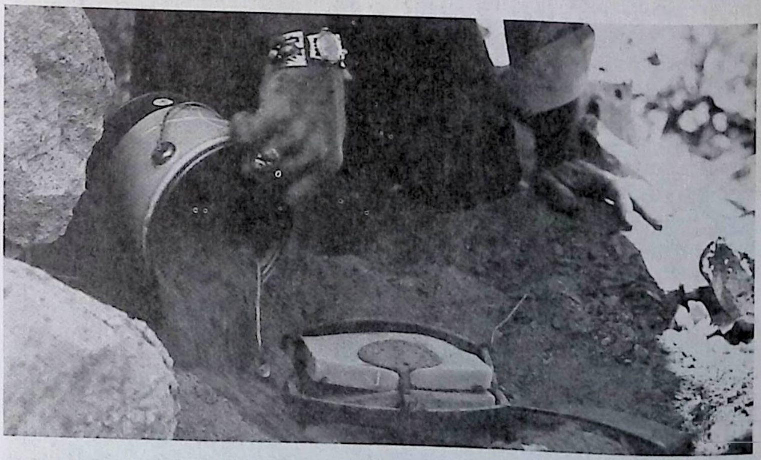
Uncomprehending, the big cat tried to reach a tree, a haven that had never failed to protect him in years past. Each lunge for a nearby tree caused more pain until the lion finally laid down in the scanty shade of a manzanita bush. Shock, a hot June day, and lack of water combined to kill the lion before sundown.

The growl of a pickup truck two days later signaled the arrival of the trapper hired by the ranchers in the area to keep lion traps out continuously. Walking quickly up the steep slope to the juniper tree, he followed the short and obvious trail of the trapped lion. Casually, the man stepped on the two springs of the trap and pulled out the lion's paw. The body was dragged further down the steep slope and heaved over a cliff.

As the man worked at resetting the trap in the same place, he was mentally adding up the lions caught at this spot. He had caught four in the last three months, and he knew of at least 15 more caught here in the past by others. "Pretty good spot," he thought, as he coiled the drag chain in the hole,

Setting a trap for a mountain lion





placing the trap on top. Cocking the jaws, he carefully replaced the foam rubber under the trigger so that the resistance would be far too great to capture small animals that might use the same trail.

A dead limb was about two feet above the trap and wedged against the juniper so that deer and cattle would be unable to spring the waiting trap. "Sure wouldn't want to catch a cow," he chuckled to himself, walking back to the truck. He had six more traps to check that day and was in a hurry.

Of the two ways generally used to kill lions in Arizona, trapping is by far the "better," at least from the rancher's point of view. It is not as glamorous as hunting with lion dogs, to be sure, but it is very effective. The skilled use of a #4½ wolf trap in good locations can result in total and indiscriminate lion eradication over very large areas.

Lions are very habitual animals, almost mechanistic in their travel routines. Consequently, even a lion new to the area will often use the same travel routes through the country and leave his (or her) scent at locations like the old juniper tree. Once such a place is found, it can be used indefinitely by the trapper. The lion ignores any human scent, making it easy to reset the trap again and again in the same spot. By its very nature, trapping is incapable of any discrimination between the few lions who do kill cattle and the many who do not. Sooner or later, cocked and waiting for weeks, the trap will catch any lion in the area.

In contrast, hunting with dogs is capable of discrimination, of removing the offending lion. By hunting from the kill, the stock-killing lion can be caught. If desired, the lion can then be tranquilized and released in a distant area, instead of routinely killing it.

However, hunting lions with dogs requires highly trained dogs, good horses, and a great amount of time. As the years go by, skilled lion hunters grow harder to find and more in demand. Finally, much of Arizona is too hot and dry for adequate scent tracking during much of the year unless the scent is very fresh. All of the above factors add up to an increasing reliance on the trap with its potential consequences for the continued survival of the lion.

While Arizona still has a bounty on the lion (along with the wolf, coyote, and bobcat), no money has been appropriated by the Legislature since 1969. This has led to private lion bounties, with some ranchers paying $200 for each lion killed on "their" land, most of which is owned by the public. There is no pretense made at discrimination. The payment of such bounties causes selective and very intense pressure on the lion population of such ranches. The trapper, the sport hunter, and the professional hunter with his dogs find it more "rewarding" to concentrate on ranches paying a bounty.

As a resident species, all management of the lion is under the jurisdiction of the Arizona Game and Fish Department. Since 1971, regardless of the private bounty and other impressions to the contrary, the mountain lion has been classified as a "big game" species.

Unfortunately, the same Legislature that granted big game status to the lion also made any subsequent lion management very difficult with the passage of a law giving the livestock industry nearly unlimited freedom to kill lions and/or black bear. Due to the intentionally ambiguous wording of the only real requirement of the above law (ARS 17-302) that can be enforced is the section requiring that the rancher turn in a report to the State for each lion or bear killed for stock depredation, stating what stock was killed, and where, and when.

The current law, with the rancher's freedom to pay bounties on a big game animal, is undoubtedly poor and difficult to enforce. As poor as it is, the performance of the Arizona Game and Fish Department has been even worse. The requirement that reports be filed (within ten days) after the killing of a lion is unequivocal and gives the law enforcement division of the Department ample opportunity to act.

Defenders of Wildlife recently received an anonymous letter from an employee of the Arizona Game and Fish Department that told of a very high level of *unreported* lion killing by a trapper collecting bounties from a rancher in the northern part of the state. In naming the man involved, he stated a hope that Defenders would do something, adding that such reports to his own department had been ignored in the past.

From another part of the state comes news of 19 lions trapped since January 1974, in one game management unit alone. *These were also unreported.* In this instance, the game warden bringing these facts to light warned that he would deny his own words if they were used publicly. He apparently feels that such unreported lion kills are impossible to prove and would only serve to shut off his sources of information. "At least now I know how many are being killed," he said.

Ranchers have always been reluctant to fill out the required forms for stock-killing lion or bear, despite the continued urging by their various livestock associations. When an unusually high total of lions was reported killed in 1972-1973, the resulting adverse public reaction only served to strengthen such reluctance. The reports coming into the Game Department offices dropped to a trickle in 1974, though it was widely rumored that the killing continued unabated.

The current lion "management" of the Arizona Game and Fish Department apparently reflects a high level of confidence in the lion's ability to survive liberal hunting regulations and essentially unlimited killing by ranching interests. The source of this confidence does not come from any factual data but appears to be based on opinions only.

There are no studies that can tell how many lions remain in the state, or even in one county. The actual extent of lion predation on livestock is unknown. Finally, no one knows how many lions are being killed.

One hears only unsupported opinions from the Game Department of Arizona, assurances that "there are a lot of lions out there." Meanwhile, the lion continues to be subjected to unlimited killing of an unknown number out of an unknown population.

Wildlife in Captivity

By Cecile B. O'Marr
Defenders of Wildlife

RATTLESNAKE ROUNDUPS

Few animals have been subjected to such relentless destruction by man as the snake. The inexorable spread of modern civilization has done much to reduce the numbers of some 140 species found in North America. Add to this the wanton killing of snakes. and it is easy to believe, as many conservationists do, that the long-term survival of many species is in doubt.

The pursuit of the rattlesnake—which belongs to the pit viper family and is best known for its habit of rattling the horny segments of its tail as a warning—is a long-standing Texas tradition. The month of March is the favorite time for municipal rattlesnake hunts in numerous West Texas towns and, festivals being what they are, these hunts have expanded over the years to include such things as Saturday night dances with Miss Snake Charmer contests, handling and milking demonstrations, sacking contests, snakeskin arts and crafts, antiques fairs, fiddlers' contests—you name it!

This year roundups were held at Jacksboro, Sweetwater, Brownwood, Ballinger, Lometa, Gainesville, San Angelo, El Paso, and Big Spring. These roundups may have been responsible for the gathering and destruction of as many as 50,000 rattlesnakes, not to mention the escapees that died as a result of the gassing of dens.

In the dark of night snake hunters drive to areas where snake dens purportedly exist. They are armed with Pillstrom snake tongs and with hooks. They spray gasoline into the dens in order to drive the snakes out. The very act of gassing the animals causes irritation to the lungs, and often produces secondary pneumonia, ending in lingering death.

Captured snakes are often stored in inadequate containers for long periods of time, without water. They become dehydrated and emaciated. Eventually, they are taken to the headquarters, often the National Guard Armory, or the Fair Grounds, where prizes are offered for the longest snake, shortest snake, highest number of pounds, and greatest number of rattlers on one snake.

The main event takes place in the milking pen, usually a wooden boxlike structure about 16'x16', where some of the snakes are milked for venom. Venom glands are easily injured if milking is done in a rough manner. The fresh venom should be put in a lyophilizer, frozen, and shipped to a research laboratory to produce snakebite antiserum, and to advance medical research.

After milking, the snakes are taken to the butchering area where the heads are chopped off and the bodies skinned.

This representative attended the 12th annual Big Spring Jaycees' Rattlesnake Roundup.

Big Spring is located at the foot of the giant Texas Caprock and nestled in the canyons and hills that interrupt a vast expanse of flat plains country that stretches 345 miles west to El Paso and 259 miles east to Fort Worth. More than 28,000 friendly Texans call Big Spring home. Some of these Texans were not so friendly when representatives of Defenders of Wildlife, National Audubon Society, National Wildlife Federation, and American Humane Association came to town.

The *Big Spring Herald* said Defenders of Wildlife and National Audubon Society representatives attempted to file "some type of injunction" to halt the Jaycees' Rattlesnake Roundup. This is far from the truth. The sole purpose of a visit to the County and City Attorneys was to bring the Texas State Humane Law to their attention, and to ask why it was not being enforced as it applies to rattlesnakes.

Texas law covering cruelty to animals for purposes of Section 42.11 states that " 'animal' means any. . . . wild living creature previously captured."

County Attorney Bill Eysson made it abundantly clear that any attempt to force compliance with the law would be met with indifference, if not downright amusement. He commented: "A person would probably be laughed right out of court!"

City Attorney James Gregg said snakes are not animals, and therefore the law does not apply. He stated: "In my opinion, the only good rattlesnake is a dead rattlesnake."

Snakes are animals—actually rather advanced animals. They possess a circulatory system, a central nervous system, a full set of functional internal organs, and, most importantly, a backbone.

Rattlesnake roundups attract thousands, making them financial bonanzas for sponsoring organizations, usually the Jaycees.

The Big Spring roundup was attended by an estimated 5,000 persons, adult admission $1.00. Live rattlesnakes and exotic reptiles weighed in at 2,600 pounds. Eight hundred pounds

Western diamondback rattlesnake

Gladys Porter Zoo, Brownsville, Texas

of meat were cooked and sold; 1,600 pounds of live snakes were destined for a reptile garden in Rapid City, South Dakota.

The extermination of any species results in an ecological inbalance, particularly in the predator-prey relationship. Where rattlesnakes are mass slaughtered, rodent population increases.

If western diamondbacks must be controlled in Texas—a fact yet to be determined—then the control should take place in the dens, or wherever else the snakes are encountered, and any killing should be humane.

WILDLIFE PARKS

A friend of wildlife, Ken McKenna, recently posed some interesting questions in the New York *Daily News.*

"Are drive-through wildlife parks concentration camps for animals, or are the parks the closest zoologists have come to placing wild animals in satisfactory natural surroundings?

"Are the parks consuming animals in such big gulps that some species are endangered, or do they represent the most practical solution available to the breeding of wild animals in confinement and may well mean survival for some endangered species?

"Will corporate conglomerates, who own many of the parks, do anything to turn a large profit, occasionally to the detriment of their charges, or is the entrance of rich corporations into zoological parks pumping much needed money into a field that has been mired down in poverty?"

Certainly, most of the wildlife parks are better than zoos, where the animals are caged day and night. What we must concern ourselves with now is how, and where, the animals are housed at night and during extreme hot and cold weather, and how they are cared for in

Lions and people "cage" at Lion Country Safari, Doswell, Virginia the off-seasons when the parks are closed to the public.

There is no question but what the drive-through parks, with their people-cages (automobiles), are popping like corn in the fields, and are attracting millions of freshly minted animal enthusiasts.

Some wildlife parks are good; some are far from satisfactory. *Great Adventure*, in Prospertown, New Jersey, an hour's drive from New York City, is the winner!

Great Adventure is set amidst 1,500 acres of magnificent forests and lakes. The safari park features over 2,000 animals, including tigers, more than 50 elephants and rhinos, giraffes, 20 cheetahs, hundreds of monkeys, leopards, African antelope, bears, prides of lions, herds of elk and deer, llamas, aoudads, mouflon, and multitudinous birds.

Neptune's Kingdom is a lakeside amusement area with the Aqua spectacle, a 3,500-seat marine stadium featuring a trained dolphin show.

Happy Feeling is an animal-touching area for children.

Admission to the safari park is $2.50 for adults, $2.00 for children 4 to 12; to the safari park and amusement areas, $7.50 and $6.50.

Busch Gardens will open another entertainment park in the spring of 1975. This will be located on 300 acres at Kingsmill on the James, 3½ miles southeast of historic Williamsburg, Virginia.

Animals will be primarily of the North American variety. Reindeer, bighorn sheep, elk and fallow deer are already in holding pens.

Great America is still a gleam in the eye of the Marriott Corporation. The park is planned in Manassas, Virginia on 550 acres just south of the Civil War battlefield park.

Marriott reportedly has options on the lands needed for the proposed project, a scaled-down version of the park once planned for Howard County, Maryland, but rejected by planners there.

The Wildlife Preserve, located off Central Avenue, near Bowie, Maryland, is an ABC Scenic and Wildlife attraction. Lovers of wildlife will be delighted to know that the magnificent big cats, held in "temporary" cages for two years at Florida's ill-fated Animal Kingdom, have been moved to the preserve.

THEY REALLY DO KILL ANIMALS

Violence in the movies is nothing new. It has become a catchword. The bullets for humans are blank, but they really do kill animals!

The buffalo and elk were killed in "Jeremiah Johnson." The deer died for the Richard Burton film, "Bluebeard." The horses were trip-wired in Sam Peckinpah's movie, "Pat Garrett and Billy the Kid."

In February 1974, we wrote Jack Valenti, president of the Motion Picture Association of America, protesting cruelty to animals in films.

After meeting with representatives of the motion picture industry and national humane associations, Mr. Valenti said: "We are determined to abolish inhumane treatment of animals in films."

To support Valenti's commitment, MPAA board directors adopted a resolution reaffirming its resolve to treat animals in all films with attentive and humane care. MPAA members are leading producers or distributors of films in the United States.

SPRINGFIELD, ILL. ZOO INVESTIGATED

The Henson Robinson Children's Zoo at Springfield, Illinois has concerned us for some time. It is typical of many city zoos that "are doing the best they can with the money and facilities available."

The zoo, entering only its fourth exhibit season, has been under investigation by the park district, the Animal Protective League, and Defenders of Wildlife.

The zoo holds about 150 animals year-round, a number that increases to 225 during spring and summer, when the facility is open to the public.

Since April 1972, zoo figures reveal that 130 animals have died in the facility.

– A pony and sheep drowned when put in a compound that included an unused, partly filled sewer tank.

– Two European fallow deer died because they were bought by the zoo a few days after birth, too early to wean.

– At least 60 small animals and birds were killed by predators who dug under the zoo's fence.

– A sparrow hawk was overfed because a former keeper enjoyed watching the bird eat live mice.

Considering the harsh environment of central Illinois, and the limited facilities for animals other than barnyard species, it is difficult to understand why the zoo administrators were permitted to accept donations of animals from other zoos, and to spend $1,400 of its 1973 budget towards more animal purchases.

ANIMAL DISEASES PEOPLE CAN CATCH

More and more reports are being made of animal diseases people can catch. The latest to come to our attention is lymphocytic choriomeningitis (LCM), a disease of the brain.

LCM may be passed on to man via contact with rodent excreta, or inhaling contaminated dust from infected mice. It may also originate from hamsters and guinea pigs.

Pet hamsters were the culprits in a New York case reported by Dr. T.R. Van Dellen.

At the University of Rochester Medical Center, staff members who were using one particular copy machine were coming down sick with fevers and headaches. There were also changes in their blood cell counts.

Due to lack of space, the copy machine had been placed in a room used to house Syrian hamsters being used in research. It turned out that the hamsters were giving off a virus, carried in the air, that infected humans walking frequently between the cages to the copy machine.

Death Rains Down From the Big Sky

Sheepmen Want 1080 Back

Article and photographs by

Dick Randall

Defenders of Wildlife

In April the Defenders of Wildlife received a letter from Mr. and Mrs. George Verstegen of Great Falls, Montana. This couple has been engaged in the ranching business in the Big Sky Country of Montana for almost 60 years and here is part of what they had to say:

> Our livestock board is unbelievably outdated. Our stockmen's organizations are worse. They claim to represent 100 percent of the agricultural community on the basis of a 17 percent response to a questionnaire sent to sheepmen. They do not say what percent of Montana sheepmen actually were sent the questionnaire. Numerically the stockgrowers organizations represent a very small segment of a huge industry but they make most of the noise and get ALL of the attention from the entrenched livestock and 'control' agencies. My husband and I have been profitably engaged in the livestock business for most of our lives. We have never had to torture-to-death by poison and trapping coyotes and fox to prevent livestock losses. We also never had to control rodents by expensive, artificial means, because we had natural predators to do it for us, free. We also never had much of an insect problem because the clean scavengers nature provided us took care of such things as cleaning up after-birth from calving and foaling so there were no rotting materials left for the flies to breed in. We had help from the birds in controlling mosquitos. We think we are more truly representative of the real Montana livestock industry than are the State Departments and the Stockgrowers Organizations. They have not yet stepped into this century!

Attached to this letter was a news clipping from the *Great Falls Tribune* that headlined, "State Launches Predator Control Plans, Hearings Set In Three Cities." Defenders thought that these hearings might be worth looking into, so on May 22, after a hectic trip through a spring blizzard that grounded my aerial transportation and made the going rough for the Greyhound bus in which I finished my trip, I found myself in Lewistown, Montana.

The predator hearings began at 9:00 a.m. in the Fergus County Courthouse and were chaired by Mr. William Cheney, administrator of the Montana Department of Livestock. When I stood and introduced myself as a representative of Defenders of Wildlife, a noticeable chill swept through the courtroom that was packed with sheep ranchers. When I glanced through the list of people who had signed that they wished to testify at the hearings I knew I was about to receive my baptism-under-fire as a Defenders of Wildlife representative. After each name was the word "rancher."

The Lewistown hearings were designed to gather input on an environmental impact statement drawn up by the Montana Livestock Department and pursuant to predator control.

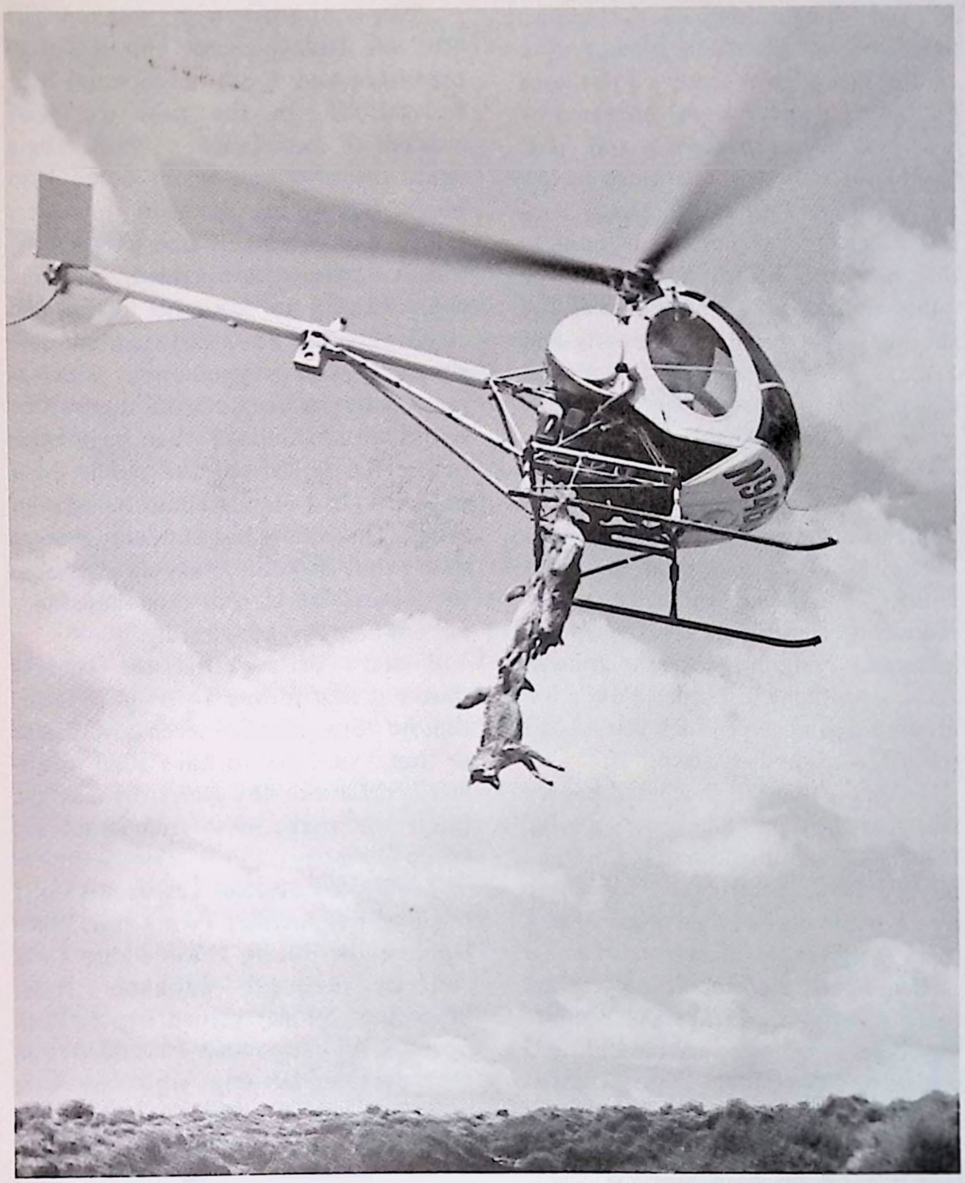
David H. Smith, secretary of the Montana Woolgrowers Association, led off the testimony and stated that his organization had 2,500 members and represented 90 percent of the Montana sheepmen. He stated that the eagle had been omitted from the list of predators in the impact statement and then he wondered if the increase in rabid animals in Montana might be a result of the loss of chemical poisons. He went on to say that the ban on 1080 had no basis in fact and that toxicants are necessary for the protection of livestock and of human health.

Several sheep ranchers testified and each stated the he "had to have the 1080 back." Then a rancher stood up and announced that last Saturday he had "drowned out five and had burned out seven" coyote pups. I glanced around the courtroom to see if seven "burned out" coyote pups would cause any eyebrows to be raised. Not a flicker.

Next came a sheepman who testified he had been fighting predators for 34 years and had killed 617 adult coyotes from an airplane. This rancher was extremely bitter toward Public Law 92-159 (aerial hunting) which he said violated the rights of the rancher to protect his own property. He was also bitter toward a proposed amendment to 92-159 under which the Montana Department of Livestock would issue aerial hunting permits but would restrict this hunting to areas where predation was occurring. Under the proposed amendments the applicant would be required to submit a map showing proposed hunting areas and listing the kind of livestock that was being "killed, destroyed, maimed or injured." This sheepman stated that he didn't have time to wade through all this red tape.

At the present time aerial hunting in Montana is conducted by government and state aircraft. I have been informed that about 1,100 coyotes were killed from these planes during the month of April of this year.

Public hearings have already been held in Montana pursuant to Public Law 92-159 and from what I could gather, these amendments will be allowed and anyone meeting the requirements can receive a permit and conduct his own aerial hunting. The restrictions that would confine this hunting to trouble areas would be completely unenforceable. Anyone trying to monitor aerial hunting from the ground would be out of touch as soon as the aircraft he was watching slid behind the nearest hill. The only method of observing aerial hunting would be from another aircraft and I doubt that the Montana Department of Livestock could afford the operation of a fleet of aircraft to keep tabs on the permittees. In fact, anyone suggesting such a thing would probably be laughed off the sheep range.



The sheepmen continued to testify about their losses to coyotes and fox and to state that they had to get 1080 released for use in predator control. One rancher stated that he used to donate one or two horses each year to the Division of Wildlife Services (DWS) to be chopped up and used for 1080 stations. The conservation organizations and especially the Defenders of Wildlife (since a representative was sitting there) were blamed for all the sheepmen's troubles. A rancher came on rather strongly and said that people who oppose predator control sit in their plush offices and don't have any knowledge of what they are talking about.

When I stood up to say a few words I informed the sheepmen that I had worked for DWS for many years and had probably killed more coyotes than any of them had ever seen and that I did know what I was talking about. This went over like a lead balloon since the old standby argument that "these people don't know what they are talking about" really wasn't going to fit this situation. I stated that I would reserve comment on the environmental impact statement and would submit a written comment after I had a chance to study it.

When the chairman called for a short break I found myself surrounded by sheepmen, some of whom were interested in learning what Defenders thought about predator control and others who were openly hostile. One sheepman greeted me with, "You are worse than a coyote." I didn't know quite how to take this so I just considered it a compliment.

The hearings resumed and there was more testimony which included, "organizations that are fighting us shouldn't be allowed a tax-exempt status," and a statement to the effect that "many sheepmen are switching to cattle and we will soon have an oversupply of cattle so the cattlemen should get behind the predator program and help."

I began this article with a letter from a man-and-wife team of cattle ranchers. I would think that anyone requesting a donation for predator control from these people would be in for a rude awakening.

A rancher testified that an eagle will "take a lamb a day and brings his friends back and there is only one way to stop him," and a Rod and Gun Club spokesman said that his organization believes that "aerial hunting is the best method of control because it can be concentrated on the problem areas."

The EPA has approved the use of the M-44 (cyanide gun) in 21 Montana counties and the only holdup in getting these guns planted in the field comes from a shortage of the cyanide capsules that are loaded into the gun. One rancher stated that "there are plenty of get-

Coyote killers: Cyanide gun (left) and helicopter are sheepmen's favorite weapons.

ters (cyanide guns) stashed in garages. All we need is one little part" (referring to the cyanide capsule). The rancher will probably be brokenhearted to learn that the cyanide capsule for the M-44 won't work in his "garage-stashed getters."

Norton Miner, DWS supervisor for Montana, said that the EPA has approved the M-44 for use in Texas, California, and Montana. South Dakota is expected to be approved momentarily. Nebraska and Kansas have also petitioned the EPA for M-44 approval. Since this is an EPA-approved program, DWS trappers will be allowed to provide concurrent services in areas where the M-44 is being used.

The EPA considers the release of the M-44 to be an experimental program and paper work will be required from the people using these devices. Ranchers will hire their own trappers to use the M-44, and since the trapper will be an employee of the sheepman, I am sure that readers can guess what an unbiased report the EPA will have to work with.

If the M-44 is ever approved for use in Wyoming it should be called to the attention of the EPA that the kit fox is listed as a rare species in Wyoming and exists mainly in Laramie and Albany counties. The M-44 would not help this little fox to survive.

Before the Lewistown hearings adjourned, a sheepman asked me to explain how I could kill coyotes for ten years and then suddenly turn around and defend them and speak out against predator control. And the question was asked in such a manner as to imply that killing predators surely must be some kind of a narcotic and how come I was no longer addicted.

When I stood up to answer this man, I was so mad I was shaking. Almost everything that I believe is wrong in predator control had been advocated, promoted, and asked for in the hours of testimony I had just listened to. I was asked to explain how I could be against a group who could sit there and listen to someone testify about "burning out" seven coyote pups and never bat an eye. A group who say they cannot survive unless they are allowed to spread poison all over the range. A group who believes that all their woes have been caused by conservation organizations and that these groups should be stripped of any tax privileges they might enjoy. And this statement came from an industry that has been bellied up against the public trough for so long that if all the subsidies and incentive payments and Federal predator control money and cheap grazing permits were suddenly removed, would probably fall flat on its wool bags.

I bit my tongue and told this man that I was against any kind of predator control that was based on the mass killings of a species, rather than concentrating control efforts in trouble areas and trying to remove the animals causing the damage. I blurted out a few other things, none of which was what I wanted to say, and sat down.

I suppose that this sheepman has the idea that one time while I was standing on a hill, a blinding flash of light struck me and I changed from a trapper into an environmentalist (that word always turns sheepmen on) in an instant.

Believe me, the process that led me to a position with Defenders of Wildlife was slow, sometimes very painful, and always very frustrating. It was a learning process which began with a sincere belief that what I was doing was in the best interests of sheep ranchers, deer, antelope, ground nesting birds; in fact, I was the guy protecting the victims from predators. I had a whole bunch of government researchers telling me that everything was just peachy in the world of toxicants, that my 1080 stations contained such a selective kind of poison that it was a wonder they would even kill a coyote. I became so involved with and enveloped in predator control that it was some time before I could step back far enough to take an objective look at what I was doing, and even then there weren't any easy answers.

I wouldn't trade my predator education for anything. I only hope that my experiences and photographs will serve to enlighten and bolster the people who have been fighting for so long for sanity in predator control.

I can sympathize with those ranchers who are losing sheep and lambs to predators and I can understand their frustrations. In the past ten years economics and labor problems have dealt the sheep industry some hard blows. But we are not going to regress into a past where, if one sheepherder wasn't cutting the mustard, five more were waiting to take his place; and strychnine and 1080 and thallium were something you bragged about as to how many baits you had out. And there will be no return to the days when huge herds of sheep crisscrossed the public lands until the dust clouds could be seen for miles. The public has suddenly become aware that they, too, have an interest in the federal lands, and that these lands are not being treated kindly.

I don't believe that the kind of thinking that moves a person to testify that he "burned out" seven coyote pups or that "we have to have 1080 to survive" will evoke any sympathy from the public or make new friends for the sheep industry.

I left the beautiful Lewistown valley in a Frontier Airlines Twin Otter. When I arrived in Billing I found that I was routed through Jackson Hole, Wyoming, for my return trip to Rock Springs. A poetic touch was added to an otherwise hectic trip while we were taking on passengers at the Jackson airport. A film crew that had been shooting on Senator Cliff Hansen's ranch near Jackson was boarding the plane when I spotted a coyote about 100 feet off the port wing of the Convair 580. I pointed out the coyote to the couple who were seated behind me, and in a few seconds all the passengers crowded to the windows to watch the coyote. A quarter-mile behind the coyote, a herd of whiteface cattle grazed, and further back were the Tetons, wearing their mantles of winter snow and shimmering in the morning sun. I remembered the closing testimony of a sheep rancher at the Lewistown hearings. "The coyote is a cunning, bloodthirsty, cruel, walking killer," he declared. I thought for a moment that maybe I should inform the people crowded to the windows that they might be in some danger, but I didn't.

Report from Capitol Hill

By Elizabeth Bennett

Defenders of Wildlife Assistant Editor

BOYCOTT

The conservation boycott of Japanese goods is alive and well in Washington—and from all indications, it's progressing elsewhere too. If the recent actions of Japanese officials are any indication, the impact of the boycott—admittedly limited at the outset—is beginning to be felt.

Senator Warren G. Magnuson, Chairman of the Senate Commerce Committee and sponsor of a bill to impose economic sanctions against countries in violation of international conservation agreements, explained why the boycott was directed primarily against the Japanese. The Senator pointed out that although both Russia and Japan "have displayed a total lack of international concern," the Russians probably could have been persuaded, but the Japanese were adamant in their refusal.

The State Department is also joining ranks with those concerned about the slaughter of the great whales. In mid-May, U.S. diplomats warned Japan that the U.S. might resort to banning Japanese fishing products if the whale slaughter continued unabated. One indication that the Japanese are increasingly concerned about the conservation boycott and the potential national boycott of their fisheries products was a meeting which took place in Washington recently.

On May 31, Iwao Fujiga, Japan's whaling commissioner, and Robert M. White, administrator of the Commerce Department's National Oceanic and Atmospheric Administration, met to discuss the plight of the whales. It is quite possible that economic and political considerations are forcing the Japanese to reassess the advisability of their whaling practices.

As Fujiga and White met in Washington, the conservation boycott was visibly alive a few blocks away. Headed by Mrs. Christine Stevens (Director of Animal Welfare Institute and a newly elected member of the Board of Directors of Defenders of Wildlife), staff members of Washington-based conservation groups that have endorsed the boycott assumed their customary Friday afternoon position in front of Japan Air Lines in downtown Washington. The conservationists—including representatives from Defenders of Wildlife—provide passersby with material on the whaling situation, a history of Russian and Japanese noncompliance with IWC quotas, and an explanation of the boycott. Those sympathetic to the cause can sign a pledge to both governments that they will personally boycott all imports until Russia and Japan have altered their position on whaling. The response has been tremendous—if the enthusiastic support of Washington area residents is any indication, the worries of the Japanese government are well-founded.

ADDITIONAL THREATS TO MARINE MAMMALS

Unfortunately, whales are not the only threatened marine mammals. The Marine Mammal Protection Act of 1972 provides, with few exceptions, for a general moratorium on the taking by U.S. citizens of almost all species of ocean mammals. It also prohibits the import into the U.S. of any furs or other products from these creatures, thus removing much of the economic incentive for other nations to kill them.

One of the major flaws of the Act, however, is that it gives the Secretaries of the Interior and Commerce wide discretion to issue individual permits for the taking of sea mammals; under certain conditions, they can even lift the moratorium completely.

A major threat to the law is now being posed by a U.S. firm, the Fouke Fur Company of Greenville, South Carolina—a large processor of sealskins. Fouke has applied to the Commerce Department for an exemption which would permit them to bring in up to 70 thousand sealskins from South Africa each year for the next ten years. The seals are seven to ten months old when taken—usually between June and October. At this point, granting of the exemption looks highly possible.

Conservation organizations have been provided with copies of the environmental impact statement prepared by the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) and its agency, the National Marine Fisheries Service. Comments on the impact statement were solicited and environmentalists have objected—violently.

FOUKE AWARD

On May 30, Rep. James R. Mann (D-South Carolina) referred more favorably to the "Fouke Company of Greenville, S.C., the only exclusive fur seal processor in the world." Fouke, Mr. Mann explained, was being "recognized with the President's 'E' Award for excellence in exporting in tribute to an outstanding contribution to a favorable trade balance." Fouke, "which processes more than 90% of the world's fur seal harvests," ships "approximately 95% of the product...back to foreign countries." Mann praised Fouke's "ingenuity," congratulated the company for its "unique ability and international reputation," and alluded to the "skill and dedication" of its work force.

BIG THICKET—FINALLY

The lengthy and often seemingly futile attempt to preserve a portion of the Big Thicket in east Texas has finally been successful. Although the Senate has passed several bills, the first Big Thicket bill ever to get through the House was passed last December. Sponsored by Rep.

Charles Wilson (D-Texas), the bill calls for the creation of an 84,000-acre Big Thicket National Preserve, to be administered by the National Park Service.

On May 30, the Senate passed H.R. 11546 after it had been amended by Sen. John Tower, also of Texas. The Tower amendment increased the acreage of the Preserve to 100,000 acres and provided for the inclusion of the Village Creek Area—a unit considered crucial by conservationists. To iron out differences between the House and Senate versions, the bill has been referred to a conference committee. A few days after the affirmative Senate vote, the *Houston Chronicle* predicted that the Tower amendment was almost certain to be defeated in the conference committee.

Although Rep. Wilson's bill was the ultimate vehicle, much of the credit for final success must be attributed to the efforts of former Sen. Ralph Yarborough, whose interest in the Thicket dates back to the 1930's. Mr. Yarborough introduced the first Big Thicket bill in the Senate in October 1966—and worked for years, both in Washington and Texas, to secure adequate support. After Mr. Yarborough left the Senate, Rep. Bob Eckhardt, who had worked for a Big Thicket park since his arrival in Congress in 1967, carried on the battle.

As far back as 1939, the East Texas Big Thicket Association was working to set aside 430,000 acres. Thirty-five years later a sadly reduced Big Thicket has been accorded a measure of protection.

HOUSE REORGANIZATION PLAN SIDE-TRACKED

On May 9, the Democratic caucus voted to sidetrack Rep. Richard Bolling's (D-Missouri) reform of House procedures and committee structure. By a 111-95 voice vote (assuring that none could tell how individual Democrats voted) the Democrats voted to send the reform proposals back to the caucus subcommittee for further consideration.

The caucus subcommittee, headed by Rep. Julia Butler Hansen (D-Washington), has been ordered to report back by July. Until the caucus acts on the Hansen subcommittee report, the Rules Committee has been ordered not to report the reforms to the House Floor for consideration. A few members of the Hansen subcommittee have led the fight against the reforms and over half have publicly taken positions against the reform package. Proponents of the Bolling plan claim that this move will drastically weaken or possibly kill the reforms for this Congress. Conservationists were opposed to several key provisions in the reform package.

TAXES...AND PRIORITIES

Less than one-half of one percent of your federal taxes go toward environmental and natural resource expenditures. According to economist-columnist Sylvia Porter, a person earning $13,000 annually pays out $3,623 in direct and indirect federal taxes. Of that amount, the grand sum of $17 is allocated for wildlife programs, managing natural resources for parks and recreation, and controlling air and water pollution. Keith M. Schreinder, associate director of the Bureau of Sport Fisheries and Wildlife, put those figures into sharper perspective when he pointed out that "It costs more to build one highway interchange than is spent on the whole endangered species program in one year."

RESULTS

Those priorities might help to explain some recently released population figures. From *California,* we learn that the original list of 43 rare and endangered species compiled by the state Fish and Game Department has been expanded to keep up with the deteriorating situation. Three species have been added to the endangered list and three more are now classified as rare. Furthermore, the status of four fish has been reclassified from rare to endangered. In all, 26 species are listed as endangered and 23 are considered rare. The Fish and Wildlife Service recently announced the results of its 1973 survey of *bald eagle* nests in the lower 48 states. Six hundred twenty-seven active nests, from which more than 500 young were produced, were located. From its findings, the Service estimates that the U.S. south of Alaska has about 1,000 nesting pairs of bald eagles. The report characterizes the outlook for the bald eagle's future as "mixed." Populations in the Chesapeake Bay area, parts of Florida, the Pacific Northwest, and the northern interior of Minnesota, Wisconsin, and Michigan are now holding steady with some possible gains in the Minnesota population. On the other hand, eagles in the Northeast, Great Lakes shores, and the Southeast (except some parts of Florida and Louisiana) are either declining or gone. Nesting eagles are also virtually gone from Iowa, Tennessee, Kentucky, Missouri, and other states along the Mississippi drainage. Fish and Wildlife also announced that the official count of the endangered *whooping crane* population is 49. Finally, the Commerce Department's National Oceanic and Atmospheric Administration has released the official count of *gray whales* off the California coast. The yearly count which is taken during the annual southward migration represents the highest total since official figures have been kept since 1967. This annual census is the most reliable indicator of the population trend of gray whales, but the count is only an index of relative abundance, and not an accurate indication of the total gray whale population. And the index should cause no undue optimism—a number of variables (weather conditions, visibility, and ocean currents) must be taken into consideration. Thus, this year's count, approximately 15% above the six-year average, does not necessarily indicate an increase in the gray whale population. Along with the finback, sei, sperm, bowhead, blue, humpback, and right whales, the gray whale is included on the list of endangered species. Lest you think Americans are particularly gifted in eradicating wildlife, the news from abroad is equally dismal: Sweden's peregrine falcon population continues to decline. Last year's nesting results of the falcon declined by about 50%—a total of only 7-8 pairs managed to hatch 11-13 young.

SOUTH AMERICA COORDINATES CONSERVATION EFFORT

There is some *good* news. Colombia, Peru, and Venezuela have recently adopted strict and long-needed protection for their wildlife populations. Hopefully, a coordinated regional effort will have a substantial effect on the illegal animal and skin traffic flourishing in that part of the world.

Peru has imposed an indefinite ban on the hunting or capturing of all spotted cats and the puma, all monkeys, the giant anteater, giant armadillo, giant otter, manatee, and marsh deer. This ban will also apply to trade in products of the species mentioned.

The government of Colombia has also imposed an indefinite total ban on the killing or capturing of jaguar, ocelot, spectacled bear, giant otter, and bush dog. All exploitation along the eastern side of the Andes has been prohibited, and the taking of crocodilians has been drastically curbed. The peccary, boa, anaconda, and various small cats—whose skins have been the object of intensive trade—are also protected. These new orders should go a long way toward stopping the large traffic in illegal wildlife and skins passing through Colombian towns in the Amazon basin. Formerly, wildlife and wildlife products could be exported legally from Colombia, providing a major loophole in regional efforts to control trade in endangered species.

Venezuela, Colombia's neighbor who banned export of all wildlife in April 1973, has moved forward once again. The government has imposed a two-year ban on sports hunting of all wild animals throughout the national territory. The measure, according to a government spokesman, "was taken in reaction to a noted decline in populations of certain species," and will hopefully "discourage tourists seeking hunting."

With Colombia, Venezuela, Peru, and Brazil having similar legislation, it is hoped that an adequate base will be provided for coordinating enforcement by the four countries against the still-thriving illegal animal and skin traffic through certain export cities. It should also discourage the activities of American, European, and Asian importers whose financial support has sustained the illegal traffic.

BRIEFS

Enforcement of New York's Mason Law has been greatly strengthened lately, mainly because of complaints from citizen conservationists. Recently seized contraband items included crocodile wallets and handbags from a Fifth Avenue boutique, hawksbill turtle jewelry from a trendy jewel shop, and smoked whale meat from a major New York department store. All have been permanently confiscated. New Yorkers should keep their eyes open on shopping expeditions. The state acts on citizen complaints and welcomes all assistant sleuths.

Governor Tom McCall of Oregon has been disignated by the National Association of Environmental Education to receive its second annual award honoring an outstanding contribution to protection of the environment. The governor of the state, often considered to be the most environmentally enlightened in the nation, recently identified land use planning as the biggest single factor in protecting the environment. "All the land we're ever going to have is in front of us, and we can't accept out past use and misuse of it as a guide for the future." Amen.

Last year's recipient of the award, Senator Gaylord Nelson, recently addressed himself to the question of "environmental backlash." During an address delivered on the fourth annual Earth Day, Senator Nelson cited the results of a recent Gallup poll which asked, "Who caused the energy crisis?" Only two percent of those questioned blamed "environmentalists." Twenty-five percent, however, singled out the "oil companies," while 23% felt the federal government was responsible. So much for backlash.

Latest grants awarded to states under the Coastal Zone Management Act of 1972 have gone to Maryland, Washington, Michigan, Mississippi, Texas, and California. The grants are designed to insure national and regional cooperation in achieving a balance of resource use and conservation along America's seacoasts and Great Lakes shores. The Office of Coastal Zone Management expects to have 29 of the 30 eligible coastal states participating in the program by the end of the year. The sole exception will be Indiana, which has not yet applied.

The League of Conservation Voters has recently issued its 1973 Voters Chart showing how all Congressmen voted on key environmental issues in 1973. Accompanying the chart is an analysis of representative average scores by state, party, and committee. The League is currently preparing a similar chart for the Senate which will be available sometime this fall. If you're interested in the information, the charts can be obtained from the League, 324 C Street, S.E., Washington, D.C. 20003. There is a charge of $1 to cover printing and mailing costs.

During the past two years, developing foreign countries have substantially increased requests for Peace Corps volunteers to work on environmental programs. Already the Smithsonian Institution-Peace Corps program has placed hundreds of volunteers in natural resource and ecological research programs overseas. If you're interested, contact Dr. James A. Sherburne, Office of Ecology, Smithsonian Institution, Washington, D.C. 20560.

Wildlife Bills in Congress

Whaling:

H.R. 15039 (Mr. John D. Dingell, Michigan). A bill to amend the Fishermen's Protective Act of 1967 in order to strengthen the import restrictions which may be imposed to deter foreign countries from conducting fishing operations which adversely affect international fishery conservation programs.

The intent of this bill is to increase the ability of the President to ban the importation of products from countries whose nationals are found to be in violation of an international fisheries conservation program. Although Congress amended the Fishermen's Protective Act in 1971 to grant the President this power, a certification by the Secretary of Commerce that such violations were in fact occurring, was required. Thus far, this section of the law has never been implemented, although investigations by the Secretary of Commerce are currently under way.

In introducing this bill on May 30, 1974, Mr. Dingell noted, "The immediate problem to which this legislation is particularly addressed arises from the activities of the Japanese and Soviet whaling fleets. Under the terms of the International Whaling Convention, nations are restricted as to the types and number of whales that they can catch. I will not go into details of the precise issue which confronts us today other than to say that the Japanese and Soviet Governments have formally notified the I.W.C. that they will not be bound by the restrictions approved last June upon certain types of whaling activities and that these actions appear to me clearly to trigger the sanctions provided in the Fishermen's Protective Act.

"The unilateral and intransigent positions adopted by the whaling nations require a strong and positive response by this Nation and by other nations of the world. In some manner, the message must be communicated that this attitude cannot be tolerated and that international conservation agreements must be carefully and responsibly adhered to lest the resources themselves be destroyed. The bill introduced today serves this purpose.

"It is clear that, at least with respect to Japan, the ability of this country to close off our markets to fish products is of considerable significance.... The bill increases the power of the President to impose additional sanctions upon countries which choose to violate or ignore international conservation agreements. It steps up our power to increase the prohibition to cover other products than fish products alone. I believe that it will not be viewed with indifference by any of the members of the International Whaling Commission, nor should it. The weapon which it creates is a meaningful one, and should be used with extreme care.

"We are watching with great interest the current negotiations which involve the future of the International Whaling Commission. The next meeting of the Commission is scheduled to be held in June.... This meeting may well indicate the direction in which the Commission is going, and whether or not there is any useful purpose to be served by allowing it to continue. It may also suggest, in stronger form than has yet been done, the need for prompt action by the Congress along the lines of this bill."

Environmental Education Act:

S. 1647 (Sen. Gaylord Nelson, Wisconsin). Enacted in 1970, the Environmental Education Act authorized $45 million in grant funds over three years for: environmental education programs in elementary and secondary schools; curricula development in environmental studies; training for teachers, public service personnel, government employees, and business leaders; adult and community environmental education programs. During the first three years of its existence, the bill generated widespread interest in its grants program, receiving a total of 4,700 grant applications amounting to approximately $180 million. Inadequate appropriations, staff shortages and administrative delays, however, severely hampered the potential effectiveness of the bill.

Now after nearly a year's battle, The Senate and House have concurred on a three-year extension of the Act, despite strong Administration opposition. The bill was sent to the White House on April 29 and signed into law by the President on May 10, 1974.

The remaining problem—and it is a substantial one—is the question of appropriations. The bill passed by Congress authorizes $5 million for fiscal '75, $10 million for fiscal '76, and $15 million for fiscal '77. Since the Administration was opposed to the extension of the bill, it did not provide appropriations in the President's proposed budget for fiscal '75; an Administration request for additional funds for this program is not expected.

As a result, the question of funding this particular program has been taken up by the House Appropriations Committee as a part of the Department of Health, Education and Welfare budget. The Subcommittee held hearings on the HEW budget the first two weeks in May and mark-up sessions are scheduled for the end of June.

Supporters of environmental education are hopeful that members of the Committee will vote an appropriation of at least $5 million for fiscal 1975. The success of the Environmental Education Act, in terms of stimulating interest and innovation in this field, was impressive, despite inadequate funding.

As Sen. Gaylord Nelson pointed out, "The objective of the legislation is to provide a sound education for the next generation of Americans who will have to address the critical issues of the future. They must have the insight and knowledge to manage our limited natural resources, to plan for future economic growth, and to protect and enhance our environment. The Environmental Education Act is the only federal education program that directly attacks this challenge."

Big Thicket National Preserve:

H.R. 11546 (Mr. Charles Wilson, Texas, and 25 co-sponsors). Establishes an 84,000-acre Big Thicket National Preserve in Texas to be administered by the National Park Service. H.R. 11546 was passed by the House last December.

On May 30, an amended version of H.R. 11546 was passed by the Senate. The amended version calls for creation of a 100,000-acre Preserve. There will be a House-Senate conference to determine the final version of the bill.

BLM Organic Act:

H.R. 5441 (Mr. Steiger, Arizona, Mr. Clausen, California, Mr. Camp, Oklahoma, Mr. Dellenback, Oregon, and Mr. Sebelius, Kansas.) The act establishes three basic policies for BLM lands: the lands are declared a "vital national asset"; it requires that "the uses of public lands be balanced in a manner which will protect their environmental quality;" and that ownership be retained by the federal government.

The Subcommittee on Public Lands, House Committee on Interior and Insular Affairs, has held several mark-up sessions on H.R. 5441.

During congressional hearings, the need was emphasized for BLM to have the authority to designate potential wilderness areas; a proposed time frame of 8-10 years would be provided to complete studies of potential areas. The subject of "instant wilderness"—that is, protection for areas under study to prevent further development and despoilation which would negate their qualification for wilderness inclusion—was another frequent suggestion. Among those testifying that BLM primitive and roadless areas be accorded that protection was Louis Barassi, president of Defenders of Wildlife. The proposal, however, was dismissed by the Committee as being impossible because of the shortage of time to hold adequate public hearings before enactment of the bill.

Rep. John Melcher (D-Montana) requested the staff to draw up an acceptable formula to establish grazing fees at fair market value. He also emphasized the need for a tenure provision for grazing licenses and permits to encourage more private investment in range improvements. He suggested the Secretary be given the authority to grant up to a 10-year option on a lease; the Secretary would, however, retain the discretion to cancel the lease for abuse, violation, or a greater public need. The law enforcement issue produced little controversy, since it was generally agreed that lack of this authority had hampered BLM in the past.

Mark-up sessions will continue through late May, at which time a clean bill will be reported to the Full Committee for further consideration.

Meanwhile, the Senate Interior Committee approved an amendment sponsored by Sen. Lee Metcalf (D-Montana) to the Senate BLM Organic Act. The Metcalf amendment requires that BLM study potential wilderness areas it administers, hold public hearings such as those required by the Wilderness Act, and report its recommendations to the Congress. Senator Metcalf was forced to accept a modification of the amendment denying interim protection to the wilderness study areas. Once this modification was made, the Metcalf amendment was unanimously adopted. The bill was reported out of Committee on May 2—it next goes to the Senate floor.

Chattooga River in North Carolina, South Carolina, and Georgia, Designated as Wild and Scenic River:

H.R. 9492 (Mr. Roy A. Taylor, North Carolina, and three cosponsors). Designates the Chattooga River in the states of North Carolina, South Carolina, and Georgia as a component of the National Wild and Scenic Rivers System. Passed by the House December 3, 1973.

S. 2385 (Senator Herman E. Talmadge, Georgia, and one colleague). Similar to H.R. 9492. Senate hearings were held on February 26, S. 2385 was passed by the Senate March 22 and signed by the President on May 10, 1974. PL-93-279.

Cuyahoga Valley National Historical Park and Recreation Area, Establish:

H.R. 7167 (Mr. John F. Sieberling, Ohio, and 24 cosponsors). A bill to provide for the establishment of the Cuyahoga Valley National Historical Park and Recreation Area. House Committee on Interior and Insular Affairs held field hearings on April 8 and June 8.

Eastern Wilderness Act of 1974:

S. 3433 (Sen. Henry Jackson, Washington, Sen. Birch Bayh, Indiana, and Sen. James Buckley, New York). To further the purposes of the Wilderness Act of 1964, the bill proposes 19 areas for immediate designation as wilderness and 39 additional areas for study. The areas, which are all on national forests, are located in 23 states east of the 100th meridian. Study areas would be protected as wilderness until Congress acts on their final disposition under a review process which calls for public hearings. S. 3433, released by the Committee on Agriculture, aspires to combine the major provisions of S. 22 and S. 316. Its function is to facilitate the administration of the National Wilderness Preservation System and to promote uniformity in the management of the Eastern and Western wilderness.

After agreeing to several amendments proposed by Senator Henry Jackson which provided for (1) maintaining the grazing language of the Wilderness Act for western national forest wilderness; (2) limiting the immediate mining rights cutoff to eastern national forest wilderness areas and wilderness study areas; (3) limiting the application of condemnation authority in national forest wilderness areas to eastern areas; (4) deleting provision establishing a National Wilderness Advisory Committee; and (5) providing a protection period of a minimum of three full Congresses, the Senate passed the bill on May 31.

S. 3433 has been sent to the House.

Egmont Key National Park, Florida:

H.R. 5282 (Mr. Sam Gibbons, Florida, and three cosponsors). Establishes the Egmont Key National Park in the State of Florida, comprising 393 acres. Hearings have been held in the House Subcommittee on Fisheries and Wildlife, Committee on Merchant Marine and Fisheries.

S. 1779 (Sen. Lawton Chiles, Florida). Same as H.R. 5282. Hearings were held by the Senate Commerce Committee on April 11.

Fish and Wildlife Coordination Act, Amend:

H.R. 14527 (Mr. John A. Blatnik, Minnesota). A bill to amend the Fish and Wildlife Coordination Act of 1934 to require that all federal and federally licensed and assisted water projects consider the effects of their projects on wildlife during the earliest planning stages and throughout construction.

The bill would incorporate a number of recommendations from federal and state Fish and Wildlife agencies and a number of conservation organizations. The bill would bring projects constructed or assisted by the Tennessee Valley Authority and the Soil Conservation Service, as well as those licensed by the Atomic Energy Commission, under the act; these three agencies have previously been exempt.

Introducing the bill, Mr. Blatnik stated that "The amended act would encourage use of new procedures to prevent, compensate, and mitigate fish and wildlife losses in national water development projects. It would strengthen public participation in planning water development projects. It would help insure that features recommended for fish and wildlife be installed in phase with other project features, rather than at some later date. In short, the amendments generally are designed to insure that fish, wildlife, and other resources become 'equally considered purposes' of the national water development programs."

The need for greater consideration of fish and wildlife values in federal water projects was highlighted in a report which the General Accounting Report presented to the Congress in March. This report reveals many shortcomings in the coordination processes of the Act which was last amended in detail in 1958. The GAO Report is expected to receive prime attention when the Subcommittee on Fisheries and Wildlife Conservation conducts hearings on H.R. 14527.

Grand Canyon National Park, Enlarge Boundaries:

S. 1296 (Sen. Barry Goldwater, Arizona, and 21 colleagues). A bill to enlarge the boundaries of Grand Canyon National Park in the state of Arizona. Passed by the Senate on September 24, 1973.

H.R. 5900 (Mr. Morris Udall, Arizona). Similar to S. 1296. A controversy created by land claims of the 400-member Havasupai Indian tribe will probably defer House consideration of the Senate-passed measure until mid-June. The tribe is seeking to have 175,000 acres deleted from the existing Grand Canyon National Park and an additional 80,000 acres from Kaibab National Forest; these lands would be added to the existing Havasupai Indian reservation.

The proposal has the support of the Arizona congressional delegation, although Mr. Udall did point out that the Indian Claims Commission awarded the tribe $1.2 million in 1971 for its aboriginal claims in northern Arizona. The tribe, however, maintains that this settlement did not extinguish its rights to the area in question. In addition to congressional backing, the proposal also has Administration support. In an announcement in Phoenix on May 3, President Nixon maintained, "In addition to its historic and religious claims, the tribe needs this land to relieve overcrowding on the reservation and to provide a better economic base."

When the House Committee takes up the question, the Arizona delegation will probably seek some compromise to this extremely sensitive issue. Much of the opposition to the plan is based on fear of the precedent such action might establish. Many Indian tribes have claims pending for parks, forests, and other properties—claims which are based on historic and religious usage. Opponents of the land transfer fear that granting these lands to the Havasupai could open the Federal Government to widespread giveaways.

Land Use Planning Act of 1974:

H.R. 10294 (Mr. Morris Udall, Arizona). A bill to establish land use policy; to authorize the Secretary of the Interior to make grants to the states to develop and implement comprehensive land use planning processes to coordinate federal programs and policies; to provide land use planning for public lands, and other purposes.

The House Rules Committee, reversing an earlier decision, voted 8-7 on May 15 to release H.R. 10294 for Floor consideration. Represented by opponents as a radical attempt to halt all development, the bill is actually a basically conservative measure. It recognizes the finite nature of the resource—land—and provides only that it be prudently used. Furthermore, it reserves the decision as to what is or is not "prudent use" to local populations. The State is involved only to the extent of reviewing decisions which have more than local impact (the American Law Institute estimates that this will involve no more than 10% of all decisions). Furthermore, the federal role is minimized.

Put a Tiger on Your Back

Defenders of Wildlife has always admonished people against wearing animals. Skins, pelts, and furs look better, we think, when they're where they belong — on the animal.

Now we're congratulating a company for urging people to put animals on their backs. In cooperation with the World Wildlife Fund, Russ Togs (a New York manufacturer of women's sportswear) has introduced a "Save the Species Collection." The collection includes a variety of endangered species screen printed on shirts, jeans, and pants outfits. A percentage of each item purchased will go to aid World Wildlife's efforts.

Their advertisement is as ominous as it is catchy: "Take a good look at the animals on our clothes. It might be the last time you see them."

The measure has broad-based support from a variety of citizens groups, trade and business organizations, and labor and professional organizations. Among those lining up in support of land use planning are the League of Women Voters, the Mortgage Bankers Association, the AFL-CIO, the National Farmers Union and the Bank of America. Quite an array of radicals.

Despite this support, H.R. 10294 faces major hurdles. It is almost certain that there will be a procedural attempt to block consideration by defeating the rule and sending the bill back to committee. Furthermore, substitute legislation has been introduced by Rep. Sam Steiger (R-Arizona) and House Minority Leader John Rhodes. The Rhodes-Steiger bill, which has the support of the Administration, represents a major departure in concept and approach from H.R. 10294 and the Senate-passed S. 268.

Whales, Protection of:

S.J. Res. 184 (Sen. Warren Magnuson, Washington, Sen. Claiborne Pell, Rhode Island, and Sen. Ernest F. Hollings, South Carolina). The resolution expresses the grave concern of Congress over the actions of Japan and the Soviet Union which "violate the spirit and intent of the agreements of the International Whaling Commission which would cause further depletion of whales, a valuable marine resource; and violate the treaty provisions concerning salmon and conservation recommendations on halibut adopted by international commissions." The joint resolution also directs the Secretary of Commerce in consultation with the Secretary of State to "determine and report to Congress what action can be taken to promote international compliance with conservation measures agreed to by the Stockholm Conference on the Human Environment, the First Session of the U.N. Governing Council for Environmental Programs, the International Whaling Commission, or contained in the marine and fishery treaties, conventions, and international agreements to which the United States is a part."

Referred to the Senate Commerce Committee, Subcommittee on Oceans and Atmosphere.

H.J. Res. 866 (Mr. Alphonzo Bell, California, and Mr. Donald Fraser, Minnesota). Similar to S.J. Res. 184. Referred to House Committee on Foreign Affairs.

Wilderness Areas, Establish:

H.R. 12884 (Mr. Melcher, Montana, Mr. Hosmer, California, and Mr. Haley, Florida). An Omnibus Wilderness bill which would provide for the creation of St. Marks Wilderness, Florida; Agua Tibia Wilderness, California; Emigrant Wilderness, California; Cape Romain Wilderness, South Carolina; Chassahowitzka Wilderness, New Jersey; and others. Report filed by the Full Committee April 1. House hearings were held April 29 and 30. Passed by the House and sent to the Senate May 7, 1974.

Nonreturnable Beverage Container Prohibition Act:

S. 2062 (Sen. Mark Hatfield, Oregon). A bill to ban nonreturnable beverage containers from interstate commerce. The bill, modeled after the controversial "Oregon Bottle Bill," would require a minimum 5¢ refund on all beer, malt liquor, and carbonated beverage containers, in addition to banning flip-top cans. The bill would also create incentives for the use of returnable containers of standardized design.

Supporters of the controversial measure cite the success of the Oregon measure and urge its nationalization. In testimony before the Senate Environment Subcommittee (Committee on Commerce) EPA Deputy Administrator John Quarles maintained that the energy savings would be substantial. He estimated that reusing containers, instead of making a new one each time a beer or soft drink is sold, could save the nation the energy equivalent of 92,000 barrels of oil a day—in addition to huge tonnages of steel and aluminum. Quarles stressed that this legislation has the support of the Administration as well as that of EPA.

The Senate hearings were held on May 6 and 7. The House has not yet scheduled hearings.

Omnibus Wilderness Bill:

H.R. 12884 (Mr. Melcher, Montana, and 35 cosponsors). Designates specific acreage in the following areas for inclusion in the Wilderness System: Chamisso National Wildlife Refuge, Alaska; National Key Deer Refuge and Key West National Wildlife Refuge, Florida; Chassahowitzka National Wildlife Refuge, Florida; Saint Marks National Wildlife Refuge, Florida; Wolf Island National Wildlife Refuge, Georgia; Breton National Wildlife Refuge, Louisiana; Moosehorn National Wildlife Refuge, Maine; Brigantine National Wildlife Refuge, New Jersey; Bosque del Apache National Wildlife Refuge, New Mexico; Chase Lake National Wildlife Refuge, North Dakota; West Sister Island National Wildlife Refuge; Cape Romain National Wildlife Refuge, South Carolina; Agua Tibia Primitive Area in the Cleveland National Forest, California; Emigrant Basin Primitive Area in the Stanislaus National Forest, California; Mission Mountains Primitive Area in the Flathead National Forest, Montana.

H.R. 12884 would add approximately 315,000 acres to the Wilderness Preservation System.

Reported favorably by the House Interior and Insular Affairs Committee April 11, 1974. Passed by the House and sent to the Senate May 6, 1974.

DEFENDERS ROLL CALL

March 16, 1974—May 15, 1974

NEW LIFE MEMBERS, **Arizona:** Edgar P. Kirsopp, Thomas E. Wallace. **California:** Dr. and Mrs. Ralph Buchsbaum, Mrs. Jack Goumas, Dr. Charles D. Marple, Dr. C. Skelley, Wendy J. Spiegel. **Connecticut:** John H. Clark. **Illinois:** Lydia Halverson. **Indiana:** Mrs. Doris Redfield. **Michigan:** Margaret J. Young. **North Carolina:** G. W. McDowell. **Ohio:** Mrs. Rachel A. Merrill. **Oklahoma:** Virgie White. **Pennsylvania:** A. P. Sailer, Mrs. B. D. Smith. **Virginia:** Dr. W. E. McIntyre, Mrs. J. Roger Wollenberg.

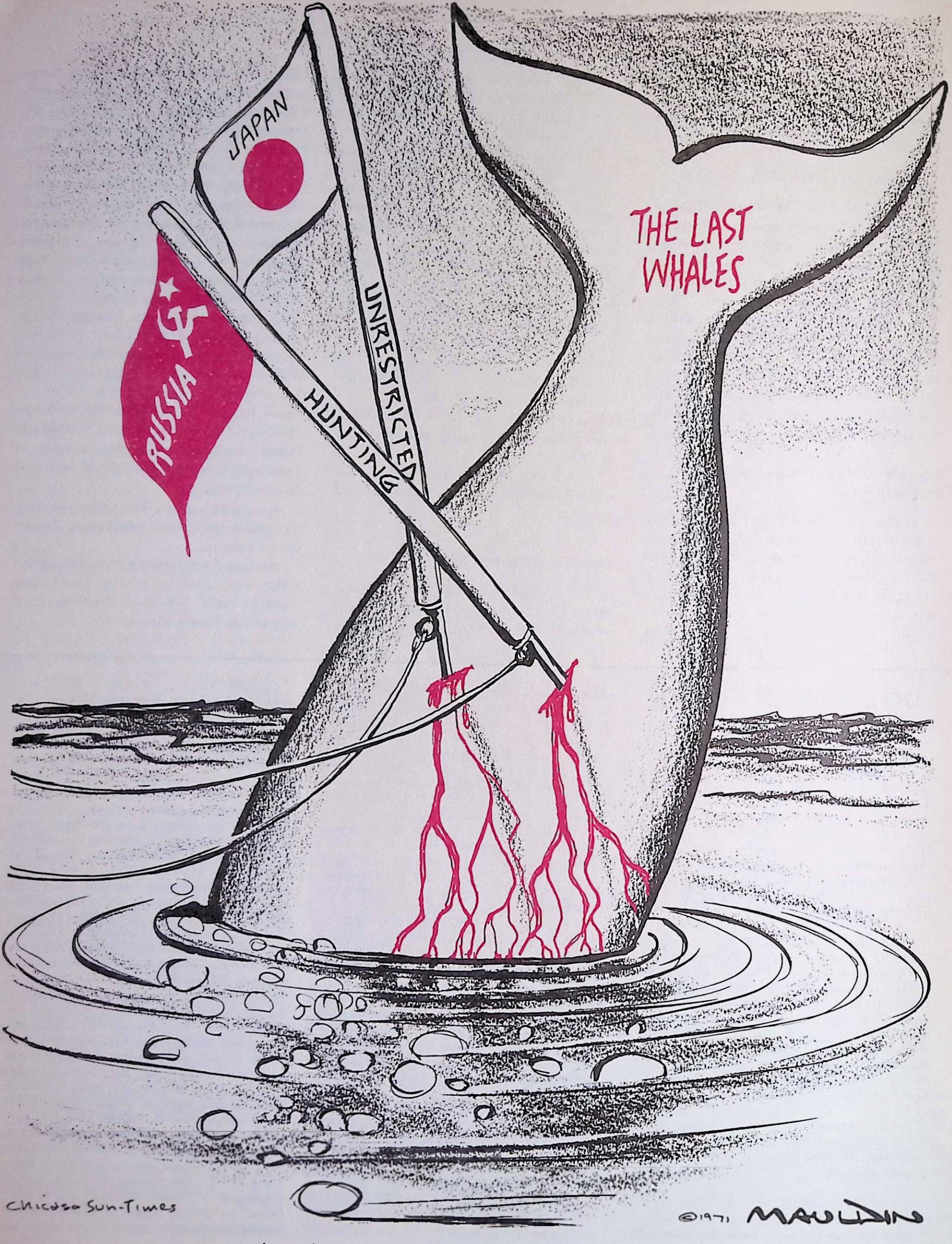
ADDITIONAL CONTRIBUTIONS FROM LIFE MEMBERS, **Arizona:** Mrs. Eugene C. Pulliam, John Reif. **California:** Margaret Owings, Mrs. Harwood Warriner. **Colorado:** Mrs. Nevin Schwien. **District of Columbia:** Mrs. John Dimick. **Illinois:** Mrs. Walter W. Richards. **Maine:** Dr. Virginia Somes Sanderson. **Massachusetts:** T. Slade Gorton, Mrs. Llewellyn Howland. **Ohio:** Mr. and Mrs. Charles W. Saunders. **Vermont:** Mrs. Bertha B. McCormick ($500 for the George Whittell Wildlife Preserve). **Virginia:** Mrs. Leon C. Warner.

JUNIOR PROGRAM (Contributors $10 and over), **California:** George C. Anderson. **Illinois:** Mrs. John W. Leslie. **Massachusetts:** Delia N. Daniels, Rod Fielding, James C. Warwick.

PREDATOR CONTROL RESEARCH (Contributors $10 and over), **Arizona:** Mrs. Cheriek Dixon, Verda P. Petty, Mrs. Margaret P. Spear. **California:** Suzanne De Pichon, Eva G. Doyle, Jan Flores, Brian Manning, Mrs. Dorothy Matheny, Mrs. Martha Ray, Mrs. Ted Schipper, Dr. J.N.L. Swain, Mrs. Harwood Warriner. **Connecticut:** Henry C. Magendantz, Marilyn Miller. **Florida:** Mabel E. Crafts, Dr. William M. George, Mrs. Robert B. Harris. **Illinois:** Mrs. C.A. Behrens, Virginia F. Clark, Mrs. John W. Leslie, W. Judy Maertz, Lillian F. McNamara. **Indiana:** Dr. James B. Misenheimer, Jr. **Maryland:** Mrs. Barry Bishop. **Massachusetts:** Mrs. M.M. Cochrane, Delia N. Daniels, C.E. Mason, Jr., Mrs. Richard Price. **Minnesota:** Ray H. Anderson, Mrs. Spencer Smith. **Missouri:** Audrey A. Alsop (two contributions), Mrs. C.I. Green, Mary E. Raup. **New Jersey:** Hermia Lechner, Mrs. Helen A. Whittemore. **New York:** Prof. A.T. Canfield, Robert E. Doubleday, Mrs. Carolyn H. Frank, Dr. S.E. Garrison, Steven Moll, L. Standard. **North Dakota:** Elisabeth Lewis. **Ohio:** Clement W. Alspach, Margaret Hanson. **Pennsylvania:** Elkins Park Junior High School, Ira T. Reynolds, Mrs. Clara Wasylik. **Tennessee:** W.C. Rucker, Jr. **Texas:** Margaret A. Brown, W.D. Cargill. **Utah:** Mr. and Mrs. John D. Ipson. **Vermont:** Dr. Gordon B. Smith. **Virginia:** Mrs. E. Packard Akerley, Rudolph H. Light, Mrs. Bedford Moore, Mrs. Leon C. Warner. **Washington:** Lawrence Knopp. **Wisconsin:** J. Thomas Brink, Kathleen A. Otto. **England:** R.E. Bates, Jonathan Malarkey.

RACHEL CARSON MEMORIAL WILDLIFE EDUCATIONAL FUND (Contributors $10 and over), **Arizona:** John Reif. **California:** Nancy Hoover Pohl. **Florida:** Mrs. Robert B. Harris. **Illinois:** Mrs. John W. Leslie. **Maryland:** Midge Hodgman. **Massachusetts:** Edward M. Abercrombie, Rod Fielding. **Michigan:** Dorothy M. Mikel. **North Carolina:** Philip Blumenthal. **Wisconsin:** Mrs. H. White.

CRUSADE AGAINST ROADSIDE ZOOS (Contributors $10 and over), **Arizona:** Mrs. Paul Bennett, John Reif. **California:** Lois Barty-King, Leslie J. Bialik, Inger Bolinger, Christine Cofield, Patricia Dixon, Florence Ebling, Bruce E. Keegan, Mrs. Thomas P. Prouty, Mrs. M.S. Ray, Mrs. Ted Schipper, Mrs. Harwood Warriner. **Colorado:** Terri Lee Scott. **Connecticut:** Mr. and Mrs. Stanley C. Barnes. **Florida:** Mrs. B.C. Brundage, Mabel E. Crafts, Dr. William M. George, Barbara M. McCabe, Mrs. J.H. Phipps, Shirley J. Walter. **Georgia:** Mrs. Charlotte Okhuijsen. **Illinois:** Mrs. C.A. Behrens, Mr. and Mrs. H.A. Joesten, Mrs. John W. Leslie, Mrs. Ione B. Lynch, W. Judy Maertz, Lillian F. McNamara, Jay E. Terkel. **Indiana:** Eric Anderson, Elsie A. Heil, Robert S. Nevin. **Kansas:** Shirley Hill. **Maryland:** Donald J. Eppig, Midge Hodgman, Jeannette W. Shamwell. **Massachusetts:** Edward M. Abercrombie, Katherine Aspinall, Ann B. Beale, Mrs. Boris P. Bushueff, Rod Fielding, Mrs. A.S. Pease. **Michigan:** Adaline R. Kroodsma, G.E. Lachapelle, Alan and Alice Martel. **Minnesota:** Ray H. Anderson. **Missouri:** Audrey A. Alsop (Two contributions), Mrs. C.I. Green, Mrs. Nelson Lawnin, Mary E. Raup. **New Jersey:** Mrs. Norman Kasschau. **New York:** Mrs. Carolyn H. Frank, Mrs. B. Thurber Guild, Nina M. Jensen, Howard Lawrence, Mrs. Birny Mason, Jr., Steven Moll, Mrs. Sunny Scheinzbach, Charles R. Whitson. **North Carolina:** Nancy A. Brown, Dwight Marvin, James Pender. **Ohio:** Clement W. Alspach, Olga C. Benderoff, Mrs. Lloyd D. Hunter, Bill Johnston, Mrs. W.P. Kessler. **Pennsylvania:** Earl Dibert, Mrs. Francis Hall, E.M. Levengood, Mrs. J.P. McDowell. **Rhode Island:** Mrs. T. Crum. **Virginia:** Mrs. Leon C. Warner. **Washington:** L.E. Echols. **Wisconsin:** Eva B. Babb, Clinton Junior High School, Richard K. Johnson. **England:** R. E. Bates.



UNDER TWO FLAGS

Boycott: Whales' Last Hope

Defenders of Wildlife was one of the first intrepid fighters on behalf of the whale. Two of its founders and benefactors, the late Edith Goode and the sculptress Alice Morgan Wright, journeyed to Geneva to lobby at an international conference on the law of the sea. They sought these many years ago a declaration that would outlaw the incredibily cruel devices used in the whale hunt.

I recall that once Miss Wright said to me: "You know, I have always been a fighter. I fought for women's rights at first. Then I decided that women could take care of themselves. I turned my attentions to creatures who had no voice or defense against men."

Braving masculine scorn and indifference, these two women won the treaty clause they wanted, but it was only a concession to their determined harassment. It was a weak bow to humanitarians, but it served notice that Defenders of Wildlife was alert and that we had adopted the plight of the whales as our cause.

But commitments of diplomats have a way of never reaching the decks of the whaling vessels. For as early as 1820 the anguish of the harpooned whale was recorded by William Scoresby. He described the courage of a mother whale whose cub was purposely attacked, not for its oil but as a snare to exploit her love of her offspring. Today the armaments of the whalers are too nauseating and cruel to describe.

However, it is not *only* the agony of the whale—thrashing in spurting blood for up to five hours—that now engages the concern of our organization. We believe it is unspeakable to subject such an intelligent, sensitive creature to such agony. We earnestly ask your active participation, as we do all in our power to end this barbarism. However, the even more tragic and depraved element we now face with the whale is that of complete extinction. Whales ought not be killed by any means because of this threat. The Department of the Interior now lists eight species on its severely endangered list.

To the eternal credit of American leadership, the last whaling station in California has been closed by government action over the screams of disaster of the owners. We are, however, but one nation and exist in a world anarchically disorganized to come to any defense of the common treasure of the seas, including the whales.

True, some 53 nations in a unanimous ballot at the United Nations Conference on the Human Environment, in 1972, expressed the hope that the International Whaling Commission would vote a ten-year moratorium on the taking of whales. Popular sentiment is that we must run no risk of driving these greatest of all mammals ever to live on this planet into extinction.

But when the Whaling Commission consisting of fourteen nations gathered in London later in 1972, they plodded along in their dismal record of impotence and avarice. Eight of the fourteen voted, to be sure, in favor of the moratorium. But that was not enough in this stacked body that demands a three-fourths vote, and whose industrial representatives demanded "thorough scientific assurances" that the whales are actually on the very brink before they silence their shattering torpedo guns.

Nonetheless, an aroused public is beginning to be heard in the councils of the world. In June of 1973 the Whaling Commission picked up a few of the signals and adopted some measures to phase out the killing (for three years) of fin whales in the Antarctic, and set quotas on minke and sperm whales—in certain areas, and under certain conditions. The hopes of the world began to rise.

Enter: the villains. Japan and the Soviet Union are together responsible for 85 percent of all the whales slaughtered today. They have a large investment in factory ships and whaling fleets whose amortization concerns them more than the fate of this magnificent species of the sea. So, in brigand style, Japan shamefully repudiated all three measures adopted by its peers. The Soviet Union then joined it in denouncing the latter two measures. These nations stand before us now defying the entire world!

The action is bitterly irresponsible. A consensus of the world's scientific community agrees that further depletion of the whale species can be nothing but disastrous. The people of the world ask: Who are these arrogant nations that assume they have the right to exterminate a valued part of the common heritage of all? Pleading, soft talk falls on deaf ears. The time for such insipid tactics are now past.

Your Board of Directors has voted to encourage its members and the public at large to boycott the products of these national culprits, Japan and the Soviet Union. In this action Defenders of Wildlife is far from alone. There are a dozen or more conservation organizations that have struck back at the spoilers.

Summer excursions to the Soviet Union have been cancelled. A vast assortment of consumer items from Japan are being shunned. People now pick up a gift shop item and turn it over to examine its source. Environmentalists are at last organizing in the marketplace where it will hurt most. One such group is SAVE THE WHALES, Box 3650, Washington, D.C. 20007. For a small contribution to cover expenses they will provide you with a bumper sticker (or as many as you want) which reads: "STOP THE WHALE KILLERS! BOYCOTT JAPANESE GOODS." Every car should have one.

This boycott strategy will not make all things right overnight. But it may shock the world's leaders into recognition of a force of opinion on behalf of the largest as well as the smaller helpless wild creatures whose ranks are thinning so fast before the murderous attack of man. Your letters to the Japanese and the Russian Ambassadors in Washington* will also mean a lot. It may soon be too late for them to "save face" by reforming. Indeed, we may have already sealed the fate of the blue whale as well as that of the humpback.

How much longer do we propose to endure a world order that merely *presides* over an extermination proceeding—in total impotence—that supinely permits Japan to sneak out under the Brazilian flag for an extra kill?

Of the eleven species of whale, seven are now so scarce that they can no longer sustain this slaughter. Since governments are helpless, and international commitments are without meaning, the people must speak. In the words of the famous ecologist, Lamont Cole: "We won't know we have passed the point of no return until it is too late."

Dr. Robert Rienow

---

*Ambassador Takeshi Yasukawa
Japanese Embassy
2520 Massachusetts Ave., N.W.
Washington, D. C. 20008

Ambassador Anatole Dobrynin
Russian Embassy
1125 16th Street, N.W.
Washington, D. C. 20003

A Low Blow to the Land

So the House of Representatives has voted for more exploitation and destruction of the land. That is the import of the 211-204 vote Tuesday [June 11] to reject consideration of the House Interior Committee's modest land-use planning bill. This irresponsible performance is deeply disheartening to those—including not only environmentalists, but many thoughtful state and local officials—who believe that cooperative federal-state efforts are required to save the nation's finite land resources from haphazard, ruinous development. The House vote should be equally discouraging for those who think that Congress can and should assert creative leadership in tackling the national problems which the executive branch has failed to meet.

The first serious blow to the committee's bill came last February when President Nixon, who had given top priority to stong land-use legislation for several years, suddenly switched his support to a weak substitute proffered by Rep. Sam Steiger (R-Ariz.). This move confounded advocates of the committee's measure, including many within the administration, and helped opponents on the Rules Committee hold up the legislation for two months. To their lasting credit, officials such as EPA Administrator Russell E. Train and Russell W. Peterson, chairman of the Council on Environmental Quality, refused to buckle. But others, such as Interior Secretary Rogers C. B. Morton, proved much more pliable, and so one of the administration's most far-sighted domestic goals was sacrificed in a move which can only have the effect—however you may choose to perceive its intent—of shoring up support for the President among the conservative elements who will be crucial to his defense against impeachment.

The bill also fell victim to a harsh, sustained campaign of distortion and emotional attack by congressional opponents and lobbying groups including the U.S. Chamber of Commerce, the Liberty Lobby, and special interests with a large stake in unrestrained building and land speculation. These forces stirred up great clouds of alarm that a strong land-use planning bill would inhibit economic growth, create a monstrous federal bureaucracy impinging on states' prerogatives, undermine property values and destroy landowners' rights. The exaggerations reached such a pitch on the House floor the other day that one opponent claimed that under the bill the farmers of west central Missouri "would have to accept the decision of Washington on where every feed lot would be located."

In fact the bill would do nothing of the kind. It simply offered federal support to those states which chose to regulate the uses of areas of special environmental concern—endangered regions such as wetlands, floodplains, and sites with particular scenic, historic and environmental significance. The actual planning and control would be left to the states and local governments. But in the general atmosphere of suspicion and sensationalism which prevailed, Rep. Morris K. Udall (D-Ariz.) and other backers of the bill were unable to make their clarifying arguments effectively. In the end, what the dominant forces in the House wanted was no debate at all, and the Steiger substitute—which many opponents of the committee bill had ostensibly embraced—was revealed to be a sham when Rep. Steiger himself urged the House to abandon the whole subject and "go home early."

Thus a crucial resource protection bill has been shelved by a coalition of the profiteers, the primitives and the President. Sen. Henry Jackson, the leading Senate champion of effective land-use planning, may try to revive the bill, but its prospects this year seem extremely dim unless attitudes can be significantly altered in the House. Meanwhile, the pressures on the land continue to intensify. Rep. Udall estimates that every business day 10,000 more acres are consumed by subdivision, parking lots and other development. Without any national program the various states and localities will be left to deal with growth, speculation and suburban sprawl as best they can. Many irreplaceable areas have already been destroyed, and many communities have been driven to extreme—and, often, ultimately ineffective—efforts to control their future development. The absence of coherent land-use planning policies does not mean the absence of regulation; instead, it means continuing the present tangle of fragmented, often conflicting federal, state and local laws, which have already cost so much in litigation, uncertainty and ugliness.

This week the House had the best chance in many years to encourage rational decisions on how the nation's land will be preserved and used. Instead, 211 representatives decided to avoid the issue and go home early.

© 1974 The Washington Post
Reprinted by permission

Book Reviews

MOTIVATION OF HUMAN AND ANIMAL BEHAVIOR—AN ETHOLOGICAL VIEW. By Konrad Lorenz and Paul Leyhausen. Van Nostrand Reinhold. $15.95.

Reviewed by Daniel McKinley, Associate Professor of Biology, State University of New York at Albany

In *Environ/Mental* (Houghton Mifflin, 1971), Paul Shepard and I tried unsuccessfully to introduce Paul Leyhausen to American readers. His essay "The sane community—A density problem?" seemed just too good, and much too pertinent, to leave in obscurity. It is fortunate that the present book offers general readers another chance to become acquainted with Leyhausen's major studies in behavior, including vitally important insights into human nature.

This book is Paul Leyhausen's, despite his junior status in authorship. Lorenz steered the young Leyhausen into ethological investigations of man and other mammals. Beyond that, his contribution is an introductory chapter (dated 1939) that will not surprise most of his American friends. Although well worth reading, its major importance today is that it turned Leyhausen into much that he would doubtless never have been.

There is an immense amount of solid work reported upon in this book. The bulk of it is not directly concerned with man but with mammalian behavior, specifically the behavior of cats and other carnivores. With keen understanding, Leyhausen has perceived that these "solitary" mammals have a social life much akin to man's: that is to say, they are social but have imperative needs to be, at times and in places, alone. His investigations probe deeper into man's behavior than most human behaviorists have managed to do but that is primarily because he has laboriously gained a deep understanding of carnivore behavior. People who think they know well their favorite alley cat have some way to go before they can catch up with the many hours of watching that Dr. Leyhausen and his colleagues have devoted to their barnyard tabbies.

There is a certain amount of unevenness in the book, for parctical chapters on the education (and miseducation!) of children and on the natural history of fear alternate with quite detailed analyses of cat and other carnivore behavior. Furthermore, there are necessarily lengthy philosophical and psychological definitions of impression and expression, drive and will, and relative coordination and relative hierarchy of moods.

There is a very healthy discussion of our tragic ignorance of "what makes Johnny run"—and pithy criticisms of our quite headstrong actions based more upon an ignorance of that ignorance than most of us are aware. His precautionary stance against classes in sex education ought to shake the faith of a lot of people who think they know the answers—or, at least, that proponents of such mass education know what they are talking about. The relatively small amount that can be done in education is pointed up in a healthy antidote to the prevailing idiocy that people are infinitely malleable because they have no instincts; and that, furthermore, people are really born *good* in the first place. Leyhausen points out that educational programs can be bad in themselves; in such instances, the only hope for mankind is that people will not be "educated." Moreover, he says, people do have instincts, many of which mature in their own good time. Because of them, we are safer from tyrants than we might otherwise be and, of course, farther from a community of angels than we might like to be. (But, until we discover a nonpolluting and nondestructive angel, why worry?)

To thoughtless charges that people do not have simple instincts ("like animals") Leyhausen replies that instincts, at least in all higher vertebrates, are not simple. Therein seems to have been a major error. As Aldous Huxley long ago observed, it is thought that is simple, nature that is infinitely complex; our troubles stem from simplemindedly endeavoring to shape earth in thought's mold.

Leyhausen's constant plea is for *time* in which individuals can allow their instincts to develop (one walks when one is ready, not when one is told or trained to do it, just as a swallow flies on its first trip from the nest) and for *space* for the free play and integration of our magnificent battery of instincts. He begs for an uncrowded world where hope is possible. If we ignore our needs, the resulting crowds will certainly mean breakdown and bloodshed. It is good to find a distinguished human ethologist telling us for 20 years what a number of ecological environmentalists have been alerting us to.

The lesson for wildlife conservationists is that we need all those "useless" animals, so that we can learn more about ourselves; and that we also need all that "wasted" space for ourselves as well as for the animals that we need to welcome into our world so that we do not become sick from seeing too many of ourselves. The tyranny of the Common Good threatens to make an end of all nonhuman life, with the end of human life (humane life will long have gone by the board) only a push button beyond that, when the ultimate tyrant learns that human instincts are not, after all, infinitely malleable.

TIGER HAVEN. By Arjan Singh. Edited by John Moorehead. Harper & Row. $8.95.

Reviewed by Robert M. McClung

A century ago, India—that vast and romantic Asian subcontinent—was renowned the world over for its colorful and abundant wildlife. Herds of spotted axis deer and blackbuck roamed the grasslands and plains, pursued by the speedy cheetah. Tigers and leopards padded stealthily through the jungles in search of prey. Around them rang the trumpeting of elephants, the chattering of rhesus monkeys, the harsh cry of the peacock. This was the India of Rudyard Kipling's *Jungle Books*, a mecca for big game hunters from all over the world.

In those days, trophy hunters descended upon India from many countries both East and West, and year after year after year they slaughtered boom harvests of big game. The numbers of deer and blackbuck, the tigers and leopards seemed inexhaustible. And all of these animals-*were* plentiful until about 25 years ago. It was then that the many years of attrition finally began to take its toll. And today the once abundant wildlife of India is drastically reduced. The Indian cheetah is now gone entirely; the blackbuck and the swamp or barasingha deer have almost vanished. The leopard, the marsh crocodile, the tiger, and many other species are seriously reduced and endangered. They, in turn, will vanish unless the present trend is quickly stopped.

In this fascinating and informative book, the reasons for this wildlife decline are graphically explained. The author, in a deeply personal account, tells of his many years of experience with Indian wildlife, and of his continuing efforts to establish a wildlife refuge and secure it against encroachment. The story is illustrated with many photographs, most of them taken by the author.

Formerly a big game hunter and farmer, Arjan Singh watched firsthand the rapid reduction of the wildlife about him. Gradually he became an ardent conservationist, a wildlife photographer and protector, as he saw India's game dwindle and disappear. In 1959 he settled on a tract of land which he called "Tiger Haven"—a farm which he bought in the state of Uttar Pradesh in northern India. It was an area just five miles from the Nepal border, where the plains met the jungle, and with the foothills of the Himalayas beckoning in the distance.

The author was prompted to write this book, he tells the reader, "because I realise that the way events are now shaping, and unless our values and material attitudes change, wildlife in India cannot last beyond a decade or so." To some, that pessimistic judgement may sound too alarmist, but Arjan Singh makes a convincing case to back up his assertion. Ever since India became independent, he notes, the country has struggled desperately against long odds to feed and clothe its ever-increasing population. In the process, the Indian land—the plains and grasslands and forests—has suffered destruction and despoilation at an ever more rapid rate. The wildlife has suffered accordingly. The clearing of land, cultivation, lumbering, poaching, the skin trade, professional hunters or shikaris—all of these have contributed to the decline of wildlife. In many ways, India is now experiencing the same great destruction of wildlife that the United States experienced in the last half of the 19th century and the first few years of the 20th. It was at this time that the passenger pigeon, the Carolina parakeet, and other American species were totally wiped out, and the bison, the pronghorn, the bighorn sheep, and many others barely escaped the same fate.

Today, the question in India is whether present wildlife conservation measures will be sufficient to preserve the tiger, the Indian rhino, the swamp deer, the blackbuck, and many other declining species. As the author notes, "...it is very difficult to promote the idea of wildlife preservation in an under developed and democratic country. Even rich and politically sophisticated nations have destroyed their animals and birds by using pesticides in the fields, and their fish by discharging toxic chemicals from factories into the streams and rivers. In a poor and overpopulated country like India the case for protecting wildlife seems to conflict with every other priority."

The cheetah is already gone from the Indian subcontinent, and the tiger—India's national wildlife symbol—is in deadly danger. A common species in the land 50 years ago, this beautiful and lordly beast has been reduced to less than 2,000 over all of the Indian subcontinent today.

In the late 1960's, after years of effort, the author managed to get an area of some 80 square miles of land bordering his "Tiger Haven" declared a wildlife sanctuary by the government. An observant and dedicated naturalist, he learned a great deal about the habits and natural history of the wildlife in the area. He tells a great deal about these animals in the book, and also tells how he has endeavored to protect the deer, the tigers, and the other wild inhabitants of the preserve. The axis deer or chital, the hog deer, the sambar, the blackbuck, the cheetah, the nilgai, the leopard, the marsh crocodile, and many others are discussed. In addition, there are numerous lively anecdotes about the author's tame elephant called Bhagwan Piari, and such pets as a leopard cub named Cheetla, and several impudent rhesus monkeys.

It is one thing to get an area officially designated as a wildlife sanctuary, the author explains, and something else again to make it a sanctuary in fact. Despite its protected status, the area around "Tiger Haven" continued to be invaded by graziers with herds of cattle; fishing and lumbering operations continued much as ever; so did the poaching and illegal trapping. "Can it be possible that we are really going to shoot the last tiger?" Singh asks. "The answer to that question depends very much on whether the camera can take the place of the rifle....If hunters could only escape from their competitive and trophy-minded attitudes, they would realise that there is a greater pleasure, a greater challenge and a greater humanity in preserving a record of our wildlife than in destroying it."

Today Arjan Singh continues his efforts to safeguard the remnants of India's once abundant wildlife. The tigers and their endangered status are especially on his mind. More wildlife sanctuaries are needed throughout India, he assers, and those sanctuaries need to be properly protected. Otherwise, the tiger and its prey alike will soon vanish from the scene.

THE SECRET LIFE OF PLANTS. By Peter Tompkins and Christopher Bird. Harper & Row. $8.95

Reviewed by Richard L. Brown, Electronic Engineer, FAA, Department of Transportation

This is a far-reaching, almost encyclopedic survey of experiments, ideas, and odd occurrences concerning sensitivity in plants. Starting with the so-called "Backster Effect," it moves in the final chapters to an operating example of something close to "The Power of Positive Thinking" where determined gardeners are apparently able to get thriving plant life under extremely adverse circumstances. The "Backster Effect," named for Cleve Backster, involves a measurable electronic reaction of the Dracaena massangeana plant to the emotional or psychic state of a nearby or emotionally involved person.

The panorama includes such illustrious names as Luther Burbank, George Washington Carver, the poet Goethe, Sir Jagadis Chandra Bose, as well as many others not so well-known. Experiments in India, Russia, the United States, and many other countries are exhibited for our consideration. The fields of activity are diverse and fascinating. The writing is sometimes marred by a tendency toward "sensationalism" in the relation of events, but the variety of material presented is ample reward for perserverance. Such things as chickens that seem to change potassium to calcium (a transmutation of elements), plants exhibiting purposeful behavior (they thrive on Bach and are stunted by "Hard Rock" music), and Energy Fields (which can be photographed) emanating from plants or human hands are interspersed with considerations of ESP, Yoga, "Life in Space," Karma, and "Water Witching." Some of the more abstruse examples, for lack of exhibited evidence, must be considered as unsubstantiated assertions.

Although sometimes a little too far off-balance in the direction of the occult, it is yet a fascinating and interesting book which points out areas of activity open to further, hopefully, unprejudiced investigation. Anyone who thoughtfully reads this book will surely have a deeper appreciation for the members of the world of plants.

COASTAL ECOLOGY—BODEGA HEAD. By Michael G. Barbour, Robert B. Craig, Frank R. Drysdale, and Michael T. Ghiselin. University of California Press. $10.95.

Reviewed by Beula Edmiston

While *Coastal Ecology—Bodega Head* deals specifically with that small peninsula jutting into the Pacific some 65 miles north of San Francisco, it offers a possible pattern for ecological surveys to merit wide attention.

Text and charts convey a wealth of precise information. Excellent line drawings add grace to the well-indexed text.

Coastal Ecology—Bodega Head should prove valuable on any ecology reference shelf and useful to those who are interested in understanding the relationship between all living things and their environments.

Dealing with the realities, the study concludes with "Man in the Bodega Head Ecosystem," both the archeological findings and modern man, and raises a vital issue. "The Indian culture lasted thousands of years. How long will ours last? Theirs seems to have been based on a stable population size. Ours, for the moment, at least, is based on growth."

CONFESSIONS OF A BIRD WATCHER. By Roger Barton. McGraw-Hill. $7.95.

Reviewed by Fred Dahmer
Naturalist and free-lance writer

Written by magazine editor, author, and speaker in the field of advertising, Roger Barton, this book seems to be a collection of selected entries from a personal journal of bird watching. Most of the observations are concerned with birds, but the author includes notes on many other aspects of nature—from chiggers to butterflies—from wild orchids to mulberry trees.

The author's home in New Jersey was designed especially to be convenient for bird watching from indoors, and several chapters are mostly devoted to the birds in and around this locality.

Mr. Barton has also traveled about the country, sometimes in the course of speaking engagements for advertising clubs, and has taken this opportunity to pursue his hobby. He reports on many of the interesting happenings on these trips. His wife, Priscilla, has been a companion on most. They have included the Atlantic, Middle, and Pacific flyways as well as Alaska and certain foreign countries.

An avid and observant student of nature, it is obvious that the author loves his subject. He finds many things of interest, and takes the reader along with him as he explores these fascinating things.

A final chapter is on environmental protection. Indeed, this theme runs throughout the book. The author rightly points out that bird watchers have a special interest here. He tells of some of the accomplishments in his locality and how to take an active part in this work.

Written in easy flowing first-person style, this engaging little book is one that will interest all who love the outdoors. There is so much more here than just bird watching that the title may be a bit misleading to some. There is no index to the specific birds and other wildlife mentioned, nor any illustrations, although the author mentions taking photos.

This book should be an incentive to beginning bird watchers—and strike a responsive chord in the "old timers," too.

THE TITANIC EFFECT—PLANNING FOR THE UNTHINKABLE. By Kenneth E.F. Watt. Sinauer Associates. $3.95, paperbound.

Reviewed by Daniel McKinley

Wildlife conservationists have not, I think, been very successful in convincing the general public and most politicians that conservationists have a good case. We are too often accused of being against Progress, Growth, Modern Conveniences, or Feeding the Hungry World. That conventional efforts to cure hunger with food, poverty with money, and the energy crisis with oil have failed miserably has not been generally acknowledged. Oddly enough, it is the conservationists who are accused of being fuddy-duddies.

You do, indeed, have to "pay" (in some short-term sense) for having wild things on earth. However, the wild things thus paid for are not useless; in fact, earth would not have been worth robbing in the first place without the millions of years of activity by those creatures that we are now deciding we can do without. Furthermore, we have simply been wrong to assume that our so-called success in exploitation of resources can (or ought to) go unexamined. If we have not yet paid for the use of resources and energy (in terms of pollution and pollution cleanup, in terms of sick people or their medication, in terms of exhausted resources or their scarcity and costliness), we shall certainly soon be doing so. *Is our widely advertised success so very real?*

The dogma that growth is not only possible but desirable has led us by the nose to the brink of a precipice. Our conventional wisdom says that it is evidence of efficiency when we take people out of labor-intensive jobs and replace them by thrice-wasteful machines. That view has been challenged in this book written by a certified ecologist; that he is able to cite corroborative evidence from enlightened economists is doubly encouraging.

Defenders of wildlife long ago saw through lies that they were told by vested interests that dodos and passenger pigeons were simply victims of *Progress*. Yea and verily, Progress has been a wonderful thing! It has given us an agriculture that is a forced-draft furnace that feeds us only if we invest in it ever-increasing amounts of cheap and abundant energy (and energy, remember, will soon be neither of these); it has given us an ocean sterilized by pesticides, heavy metals, oil, and muck; it has provided acid rains that gut the capacity of living natural communities to maintain productivity; it has surrounded us with rivers that burn and terrestrial ecosystems that fester with manmade pests, it has benevolently given us the ultimate in unemployment projects in what we now call pollution cleanup.

Kenneth Watt knows about priorities, something that our government has forgotten how to set, that our industrialists have signally failed to honor except in regard to their profits, that our society has failed to meet until addicted to cheap energy, dubiously good food, dime-store credit, material glut, saturated markets, underemployed persons, inflated prices, and disappearing resources.

This book is rich in observations and insights, unpopular though a good many of them will be. You owe it to yourself and to the biosphere to read it and pass along quickly its message. Watt was talking widely and intelligently about the energy crisis long before it was Sunday-supplement fare. He shows why food is high in price and will become costlier. He details quite clearly what we can expect in regard to trends in energy use and he worries realistically about what alternatives are available and about whether we can meet deadlines that our leaders blithely tell us to ignore. He knows about market slowdowns and saturation; about inflation and a coming surfeit of manpower; why international financial turbulence prevents rational planning; why services are more important than production of material gimmicks; and how overpopulation keys into all of this at every corner.

Professor Watt is author of books on resource management and the use of systems analysis and, more recently, has written *Principles of Environmental Science* (McGraw-Hill, 1973), the finest book in its field.

We have to play the game of life and death, and this book is a splendid guide for the alert and concerned citizen to prepare him both to play the game and to play for the necessary ecological elbowroom that may make survival possible. So far, we have assumed that repression of vision and a demand for full steam ahead, while exploiters bored bigger holes in the bottom of the boat, would get us through. But we might better try to pilot the Good Ship Earth under safer flags than those of Arrogance, Ignorance, and Affluence. Here is a manual that allows wisdom to keep mistakes small and then to learn from our errors, something that revealed religions and dogmatic economic and political systems seem doomed never to do.

WHERE DOES THE GARBAGE GO? By Paul Showers. Illustrations by Loretta Lustig. Thomas Y. Crowell Company. $3.95.

Reviewed by Elizabeth Bennett

All most of us want to do with garbage is get rid of it. Paul Showers, on the other hand, wants people—especially children—to understand it. *Understand garbage?* Right. Understand it, think about what happens to it, and eventually, control it.

Showers discusses—in simple and straightforward terms—how we make garbage and what we've been doing with it. The well-illustrated city dumps, filthy incinerators, and polluted oceans are visible proof that what we've been doing hasn't been too well thought out.

There is something we can do with our garbage, Showers says, and he provides one or two answers. But more importantly, he stimulates a lot more of the right kind of questions.

Loretta Lustig's illustrations are outstanding.

FLIGHT TO FREEDOM. By Kent Durden. Simon and Schuster. $5.95.

Reviewed by Robert M. McClung

Describing the life of a golden eagle in the wild, this sensitively written book is a sequel to the author's well-received *Gifts of an Eagle*. In that book Durden told the story of Lady, a female golden eagle which his father cared for and kept as a pet for 16 years. This continuation of Lady's story tells of her first year of freedom in the Santa Ynez Valley of southern California. The first book about Lady was a factual firsthand account of her life in captivity. *Flight to Freedom*, while presented in a factual manner and relating a number of actual incidents which were witnessed, is by necessity partly fictionalized.

The first part of the book details Lady's courtship by her mate Patu, the nest building, incubation of eggs, and rearing of young. A great deal of sound natural history is presented in the telling. The eagles' daily routine, their hunt for food, how they preen and bathe, all are covered. The natural history of the valley and the accounts of various other animals are written with sound and loving detail. Encounters with such other animals as the cougar, bobcat, wild pig, deer, condor, ground squirrel, and various others are vividly related. Particularly dramatic incidents tell of Lady's meetings with a coyote, a racoon, and a raven. During the course of the story she also has to cope with forest fire, storm, and flood.

As the author notes in the book, "It is difficult for humans to accurately describe the behavior of animals without using human descriptive terms. We can describe what we see, but often the visible action is quite different from the true or real behavior. Consequently, most nature writers tread softly lest they fall into the dreaded anthropomorphic pit." How true. And while the author succeeds in making us identify with Lady and imagine ourselves soaring on her wings, it seems to me that he sometimes falls into the "anthropomorphic pit" himself, and describes the why's of eagle behavior in human terms. All in all, however, this is a well-written and interesting book which should add to the reader's knowledge of a splendid and endangered bird species, and to his appreciation of it as well.

THE DELL ENCYCLOPEDIA OF BIRDS. By Bertel Bruun. Illustrated by Paul Singer. Dell Publishing Co., Inc. $2.45, softcover.

Reviewed by Fred Dahmer

This is one of the well-known Dell line of "paperback" pocket-sized books. It continues the reputation of this publishing house for producing books that meet the popular demand for informative texts in an inexpensive edition.

An outstanding feature is the hundreds of handsome illustrations by the noted artist, Paul Singer. The pictures and diagrams are all in full color. Printing—both text and color—is outstanding in its sharpness and clarity. The book was printed in Italy.

Bertel Bruun is among the younger generation of ornithologists, but has already earned a reputation with his two previous books on birds of North America and Europe. This book is international in scope.

All the orders of birds are listed, alphabetically, by their scientific names. In the back of the book is a cross reference from scientific names to common names. No effort has been made to include single species, as this would require a far more cumbersome book.

Entries cover information of interest to amateur naturalists who would like to know more about the birds they admire. Drawings illustrate bird nervous systems, also vascular, respiratory, and reproductive systems. Various types of nest construction are shown. Wing structure and the entire bird skeleton are discussed, and drawings with parts labeled are included. An unusual feature is the birdsong spectrograms. Other entries explain behavior patterns, breeding habits, and migration patterns. Also included are biographical notations on many renowned ornithologists.

A book that will be welcomed by those "birders" whose interest goes a little further than just the field of bird recognition.

USE THIS ORDER FORM TO GIVE A DEFENDERS SUBSCRIPTION AND TO RECEIVE YOUR FREE 1975 ENDANGERED SPECIES CALENDAR

I wish to give a DEFENDERS subscription for one year to the following recipient:

Name ______________________________

Address ______________________________

City ______________ State __________ Zip __________

I agree to pay $7.50 for the gift subscription to DEFENDERS, which entitles me to receive a 1975 Endangered Species Calendar.

☐ payment enclosed
☐ bill me

Your name ______________________________

Address ______________________________

City ______________ State __________ Zip __________

USE THIS ORDER FORM TO GIVE A DEFENDERS SUBSCRIPTION AND TO RECEIVE YOUR FREE 1975 ENDANGERED SPECIES CALENDAR

I wish to give a DEFENDERS subscription for one year to the following recipient:

Name ______________________________

Address ______________________________

City ______________ State __________ Zip __________

I agree to pay $7.50 for the gift subscription to DEFENDERS, which entitles me to receive a 1975 Endangered Species Calendar.

☐ payment enclosed
☐ bill me

Your name ______________________________

Address ______________________________

City ______________ State __________ Zip __________

USE THIS ORDER FORM TO GIVE A DEFENDERS SUBSCRIPTION AND TO RECEIVE YOUR FREE 1975 ENDANGERED SPECIES CALENDAR

I wish to give a DEFENDERS subscription for one year to the following recipient:

Name ______________________________

Address ______________________________

City ______________ State __________ Zip __________

I agree to pay $7.50 for the gift subscription to DEFENDERS, which entitles me to receive a 1975 Endangered Species Calendar.

☐ payment enclosed
☐ bill me

Your name ______________________________

Address ______________________________

City ______________ State __________ Zip __________

FIRST CLASS
PERMIT
NO. 5515-R
Washington, D.C.

BUSINESS REPLY MAIL

No Postage Stamp Necessary if Mailed in the United States
Postage will be paid by

DEFENDERS OF WILDLIFE
2000 N Street, N.W.
Washington, D.C. 20036

FIRST CLASS
PERMIT
NO. 5515-R
Washington, D.C.

BUSINESS REPLY MAIL

No Postage Stamp Necessary if Mailed in the United States
Postage will be paid by

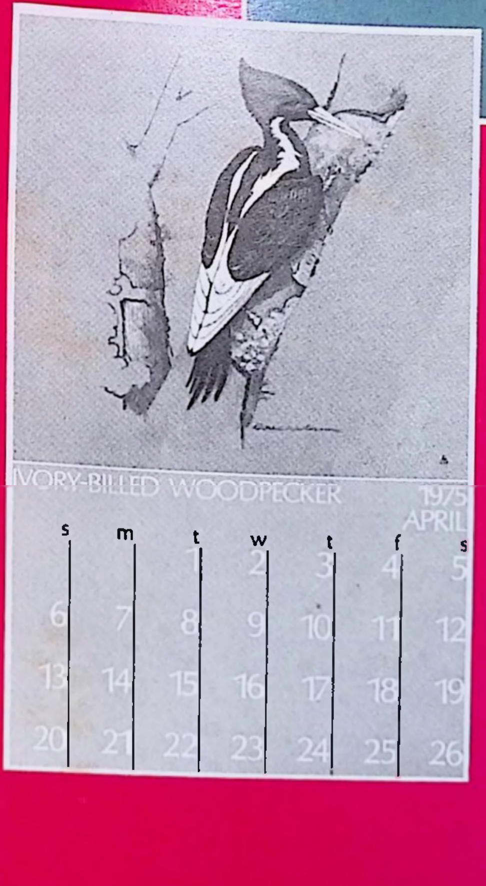
DEFENDERS OF WILDLIFE
2000 N Street, N.W.
Washington, D.C. 20036

FIRST CLASS
PERMIT
NO. 5515-R
Washington, D.C.

BUSINESS REPLY MAIL

No Postage Stamp Necessary if Mailed in the United States
Postage will be paid by

DEFENDERS OF WILDLIFE
2000 N Street, N.W.
Washington, D.C. 20036



IVORY-BILLED WOODPECKER 1975 APRIL

s	m	t	w	t	f	s
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26

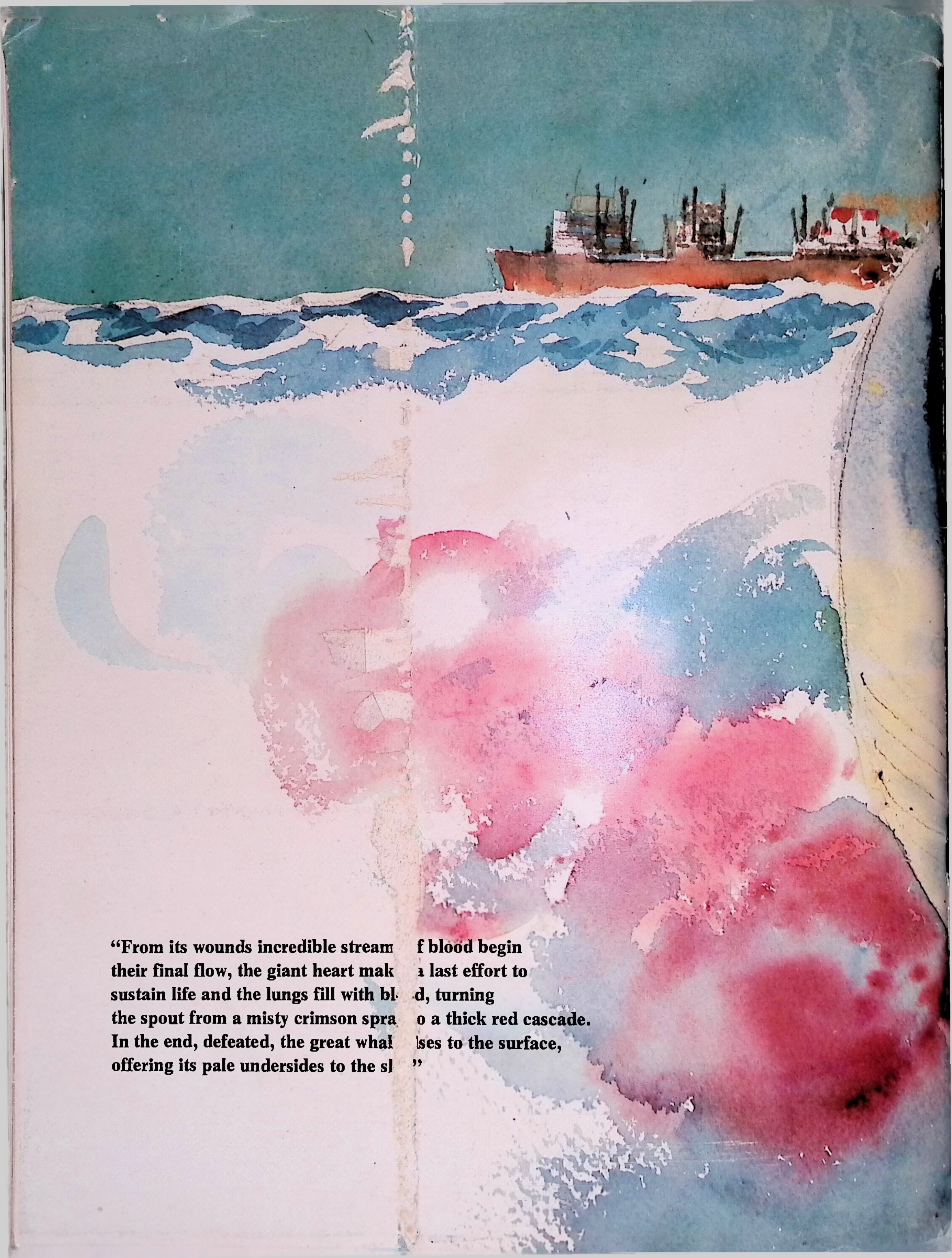
YOURS FREE *this handsome 1975 Endangered Species Calendar, adorned with twelve 7″ x 7″ full-color collector prints. It's yours for giving a subscription to DEFENDERS. Just fill out one of the postage-paid cards and mail. We will send you the calendar as a gift . . . our way of saying thanks for bringing a new member into one of the nation's oldest ecological organizations.*

You may order Endangered Species Calendars separately. They are available in these sizes

- Desk size has twelve 3½″ x 3½″ color prints .... $2.25 each
- Home and office size has twelve 7″ x 7″ color prints .. $3.00 each
- Executive size has six 12″ x 12″ color prints of either birds or animals (specify which group) .... $3.50 each

Send prepaid orders to **Calendars, Defenders of Wildlife,**
2000 N Street, N.W., Washington, D.C. 20036

Defending Wildlife Since 1925



“From its wounds incredible stream f blood begin their final flow, the giant heart mak a last effort to sustain life and the lungs fill with bl d, turning the spout from a misty crimson spra o a thick red cascade. In the end, defeated, the great whal ses to the surface, offering its pale undersides to the sl ”